MECHANICAL ENGINEERING

INCLUDING THE ENGINEERING INDEX

THE great event for engineers in the year 1920 has been the organization of The Federated American Engineering Societies, "a long cherished ideal—a comprehensive organization dedicated to the service of the community, state, and nation."

An account of the first meeting of the American Engineering Council of the Federation, held at Washington, D. C., will be found on page 720 of this number, with an address on industrial economics by Herbert Hoover, President of the Federation.

DECEMBER ·1920

THE MONTHLY JOURNAL PUBLISHED BY THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

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Mechanical Engineering

A monthly journal containing a review of progress and attainment in mechanical engineering and related fields, The Engineering Index (of current engineering literature), and a summary of the activities, papers, and proceedings of

The American Society of Mechanical Engineers

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Contributors and Contributions

U. S. Navy Gun-Forging Plant

The twenty-million-dollar Naval Ordnance Plant at South Charleston, W. Va., is not essentially a "war plant." It is a permanent Navy institution which will provide additional capacity for the manufacture of armor-plate and gun forgings at a lower price than that now paid to commercial manufacturers, and in which experiments can be carried on to improve the product and simplify manufacturing methods. Roger M. Freeman, supervising engineer in the design and construction of this plant, has prepared the first description of this notable work as a paper for the Annual Meeting. Before taking up this work Mr. Freeman was engaged in steel-mill construction at the Erie City Iron Works for the Navy Department. The paper presents the entire plan in broad outline and it is hoped that details of the various unusual features of the plant will be the subject of future papers for the Society.

Roger M. Freeman

Foundations for Machinery

N. W. Akimoff, of Philadelphia, Pa., the author of the Annual Meeting Paper entitled Foundations for Machinery, has been long connected with the development of machinery for the balancing of high-speed rotating elements. The present paper is an advance along somewhat different lines and is notable because of its new method of approach to the problem of foundations for machinery.

New Steam Formulas

R. C. H. Heck, professor of mechanical engineering at Rutgers College, has carried out an intensive study of the basic data and various formulas at present in use for the calculation of the properties of steam. Professor Heck has compared the various formulas and has derived a new series which it is believed will combine all points of value of the existing formulas. The Power Test Code Committee of the Society has had under consideration the preparation of standard steam tables for inclusion in the Power Test Code, and it is hoped that the discussion on this paper will form the basis for the formulation of such standard tables.

Rational Design of Hoisting Drums

At the request of manufacturers of hoisting drums, E. O. Waters, assistant professor of machine design, Sheffield Scientific School, Yale University, conducted a series of experiments from which a rational formula was developed for the thickness of flange and drum for use of hoisting-drum designers. Professor Waters utilized a special drum which permitted the side thrust against one flange to be measured while the rope was being wound on the drum.

Layout and Construction of Dye Houses

One of the papers to be presented at the session of the Textile Section at the Annual Meeting deals with the Organization and Construction of Dye Houses. In this paper, Mr. A. W. Benoit, of the office of Charles T. Main, Boston, Mass., takes up the location, construction, ventilation and piping of dye houses and the fundamental principles underlying the arrangement of buildings of this type and their equipment. The paper is illustrative of the special fields of activity covered by the newly organized Professional Sections, and the abstract published in the current number will be of very general interest to many members.

New York Meetings and Washington Meeting

One of the largest meetings ever held in the Engineering Societies Building, New York, occurred on October 22, for the discussion of the relative merits of steam and electric locomotives. This was under the auspices of the Railroad Section of the A.S.M.E., the Metropolitan Section of the A.S.M.E., and the New York Section of the A.I.E.E. Three comprehensive papers were presented, one in favor of the steam locomotive and two for the electric locomotive, after which there was a general discussion. In this number will be found a full report of the meeting.

Another meeting of broad interest, reported in this number, was the special meeting of the A.S.M.E. to commemorate the Fortieth Anniversary of this Society, at which there were reminiscences of the activities of the Society during its long existence, and three leading addresses having a forward look with regard to the opportunity and responsibility of the engineer. The mechanical engineer, dealing as he must with production problems, is vitally interested in determining the viewpoint of the financier, the manufacturer and the workman. Each of these elements was represented at the meeting by most capable speakers, and the addresses abstracted in this number are of such a character as to be helpful to engineers generally and to attract wide attention.

The supreme meeting of the past month, however, was the first meeting of the American Engineering Council of The Federated American Engineering Societies. It was attended by delegates from many organizations, who entered with enthusiasm into the work of establishing the engineers of the country on a firm basis of coöperation in such public activities as may need their concerted action. This meeting is also fully reported in this number.

1920 A.S.M.E. ANNUAL MEETING

Engineering Societies Building, New York, December 7–10, 1920

This issue of "Mechanical Engineering," in which a number of Annual Meeting papers are abstracted, should reach its readers shortly before the start of the meeting. Announcement of the events of the meeting was made in the November "Mechanical Engineering" and in a circular sent to the membership. A complete account of the meeting will be published in January.

MECHANICAL ENGINEERING

Volume 42 December 1920 Number 12

Armor-Plate and Gun-Forging Plant of U. S. Navy

A Description of the Government-Built and Operated Naval Ordnance Plant at South Charleston, W. Va.—"H"-Type Forge and Furnace Building Among Unique Features of Plant

By ROGER M. FREEMAN,[1] NEW YORK, N. Y.

The magnitude of such a project as the establishment of the Navy-owned, built and operated Naval Ordnance Plant at South Charleston, W. Va., has made it impossible for the author to give details on all points of the development of the plant. He describes briefly the establishment of the projectile plant and preliminary steps leading up to the actual construction of the armor-plate and gun-forging plant, a general description of which is the main object of the paper. The general layout of the plant and transportation facilities are covered and then the author passes to a more detailed discussion of the unusual features of design and construction. Among these are the arrangement of the stock yard alongside the open-hearth building, the 30-ton electric furnaces for duplexing, the electric traveling cranes to carry 400,000-lb. ingots, the original "H" type of forge shop and treatment plant combined, the 14,000-ton steam-intensified hydraulic press, the twenty 15-ft.-wide Carbottom furnaces, the machine shop with three 106-ft.-wide aisles, and the gun-treatment building, the high portion of which contains a 75-ton crane of 104-ft. span on rails 165 ft. above the floor level which serves a 10. by 105-ft. high electric treatment furnace placed in a concrete pit 55 ft. deep. The 23 electric traveling cranes, twenty of which are 75-ton or larger and three of 250 tons capacity, are discussed. The 25,000-kw. electric substations, the 6500-hp. boiler plant and the 25,000,000-gal. reservoir are also discussed briefly.

The paper concludes by summarizing the various steps in the development, outlining the organization of the project and personnel, giving in round numbers construction costs, and stating briefly the present status of work on the plant which is now substantially completed.

SEVERAL years ago the papers were again full of the historic discussion as to whether the Navy Department should attempt to manufacture armor plate for itself or continue to go to the three non-competing firms who were able to make armor in this country, and pay the price asked. With the strong backing of Secretary Daniels and Senator Tillman, and despite much opposition by the manufacturers, the public at large, and certain Navy circles, Congress directed that the plant be built. Shortly thereafter the war came on and the project was generally forgotten in the rush of ordnance manufacture for the nations of Europe and for this country, when we finally entered.

On August 30, 1917, ground was broken at South Charleston, W. Va. for the construction of a projectile plant as the first unit of the U. S. Naval Ordnance Plant. The main advantages of South Charleston lay in its being in the center of the rich coal districts of West Virginia, in the proximity of iron mines and blast furnaces, and in the availability of natural gas and oil. The reservation consists of somewhat over 200 acres of land located between the Chesapeake & Ohio Railroad and the Great Kanawha River about five miles below Charleston, at South Charleston, W. Va. It is divided into a north unit of approximately 40 acres and a south unit of approximately 160 acres, by Eighth Avenue, which is the main road and which carries the trolley line between Charleston and St. Albans.

The projectile plant, which occupies the north unit, was completed and put into operation in the spring of 1918, since when it has operated satisfactorily, producing principally 6-in. gun forgings, counter-recoil cylinders, 16-in. armor-piercing projectiles, air flasks for torpedoes, steel ingots up to 18 tons, and at the present time the entire demand of the Navy Department for armor bolts. The projectile plant cost about $2,000,000 and consists principally of a forge and foundry, approximately 130 ft. by 560 ft., containing three 6-ton Heroult electric furnaces, two 60-in. cupolas, a small brass foundry, a 3000-ton press and a 500-ton press, eleven forge and five regenerative Carbottom annealing furnaces; a machine shop, 140 ft. by 400 ft., completely equipped for machining minor-caliber gun forgings, large projectiles and general machine-shop work, and a heat-treatment shop, 92 ft. by 153 ft.

In June 1918 it was decided to vigorously push the construction of the main plant for the production of armor plate and major-caliber gun forgings. The writer was summoned from Erie, Pa., where he had supervised the construction of the Erie Forge and Steel Company and other steel plants for the Navy, and placed in charge of the design and construction. A designing and drafting force was built up around his engineering assistants from Erie and his previous work, and a half-dozen draftsmen who had worked on the projectile plant. During the summer of 1918 the layout and the general design for the main buildings were completed, and by November 1 were approved by the bureaus concerned.

It was decided that due to existing conditions in the material and labor markets, the impossibility of writing specifications and getting lump-sum bids without great delay, and on account of the general disrepute into which cost-plus contracts for Government plant construction had fallen, the work should be done directly by the Navy. A construction division was organized and construction work was under way by October 1, 1918.

The armor-plate and gun-forging plant has been designed to produce armor plate of the heaviest type, completely finished, ready to attach to battleships; and major-caliber gun forgings, up to 20-in., 50-caliber in size, rough-machined, which will be sent to the Washington Navy Yard for finish-machining. It will employ about 3000 when completed and in full operation.

The United States Naval Ordnance Plant is not a "war plant" in the modern usage of the term, but a permanent Navy institution which is abundantly justified for the following reasons:

First, additional capacity for the manufacture of armor plate and gun forgings has been provided.

Second, cost of armor manufactured by the Naval Ordnance Plant should be less to the Navy than the price now paid to commercial manufacturers and will afford a definite means of determining what the fair price for armor and gun steel to be paid steel manufacturers by the Navy should be.

Third, the Naval Ordnance Plant will be a large-scale experimental and research laboratory which can continually strive to improve the product and simplify manufacturing methods. In this connection it is interesting to note that the first group of 16-in. armor-piercing projectiles made at the Naval Ordnance Plant passed the test at Indian Head and that the plant is successfully making air flasks for torpedoes.

Fourth, a very great additional advantage in the Government-owned and operated plant is the fact that improvements in product or methods can, when desired, remain the property of the United States.

General Layout

The general layout of the south unit was determined first by the requirements of manufacture in modern straight-line methods,

[1] Supervising Engineer in charge during design and construction of Naval Ordnance Plant, Mem.Am.Soc.M.E.

For presentation at the Annual Meeting, New York, December 7 to 10, 1920, of The American Society of Mechanical Engineers. The paper is here printed in abstract form and advance copies of the complete paper may be obtained gratis upon application. All papers are subject to revision.

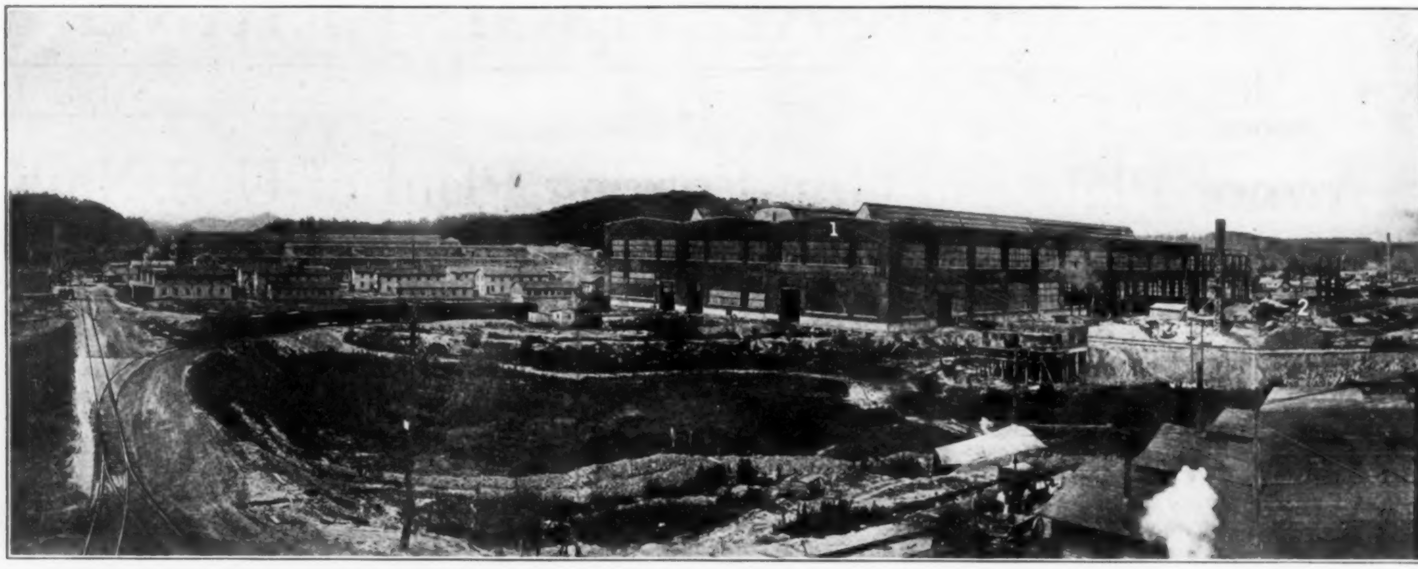


FIG. 1 THE UNITED STATES NAVAL ARMOR-PLATE AND GUN-FORGING PLANT AT SOUTH CHARLES-

Buildings:[1] 1, Machine Shop; 2, Gun-Treating Building; 3, Forge and Furnace Build

and secondly by the topography of the site. Fig. 1 shows the general layout of the armor and gun-forging plant. The four main buildings, namely, the open-hearth, the forge and furnace, the machine shop, and the gun-treatment building are arranged in parallel on a shuttle track which runs at right angles to the major axes of the buildings and connects them all together. This track will be the backbone of the manufacturing processes. All main buildings have been placed so that future expansion to double the capacity of the plant may be readily made.

Scrap and pig iron will be received from the Chesapeake & Ohio Railroad, at the southeast corner of the reservation, sorted from other incoming material in the classification yard, and stored in the stock yard alongside the open-hearth building. Steel will be melted in the open-hearth furnaces, refined in the electric furnaces, and cast into ingots in the pouring pit in the open-hearth building. From there the ingots will be transferred to the forge and furnace building, by way of the shuttle track for heating, preparatory to forging into armor plate or guns under the presses located in the center of the forge and furnace building. The armor-plate forgings will then be carbonized, annealed, tempered, hardened, and ultimately sent over to the machine shop on the shuttle track where the armor plate will be machined and finished, ready for attaching to battleships. Gun forgings will be green-annealed in the south aisle of the forge shop, sent to the north aisle of the machine shop for rough-machining, and thence to the gun-treatment building for heat treatment prior to shipment to the Navy Yard in Washington for finish-machining and assembling.

The service building, which comprises the main electric substation, the air compressors, the water-supply distribution pumps, and the boiler plant, which provides steam for the steam-intensified hydraulic presses and for heating the machine shop, are located as nearly as possible to the center of gravity of their respective loads.

Twin buildings, one of which will be used for general stores and the other for the blacksmith shop, pattern and templet making and storage, have been located in the southeastern portion of the south unit accessible to the railroad system and the forge shop.

The maintenance shops, in which the electricians, pipefitters, riggers and carpenters, are to be located, and the locomotive repair shop and roundhouse, will be combined in one building at the approximate center of the reservation.

The western portion of the south unit as divided by the main railroad track running north and south, contains a large storage yard and the "skull cracker."

The reservoir and settling basin for the industrial water-supply system has been made by throwing two earth-filled dams across the western end of the gully which cuts diagonally across the reservation.

An administration building of sufficient size to house the executives for the entire ordnance plant was built at the same time as the projectile plant and located in the south unit on Eighth Avenue. The balance of the frontage on Eighth Avenue is occupied with temporary buildings for construction offices, stores, the garage, barracks to house about 1000 men on construction work, and Bungalow Park, in which 32 bungalows were erected for the occupancy of the supervisors of the construction division.

TYPE OF STRUCTURE

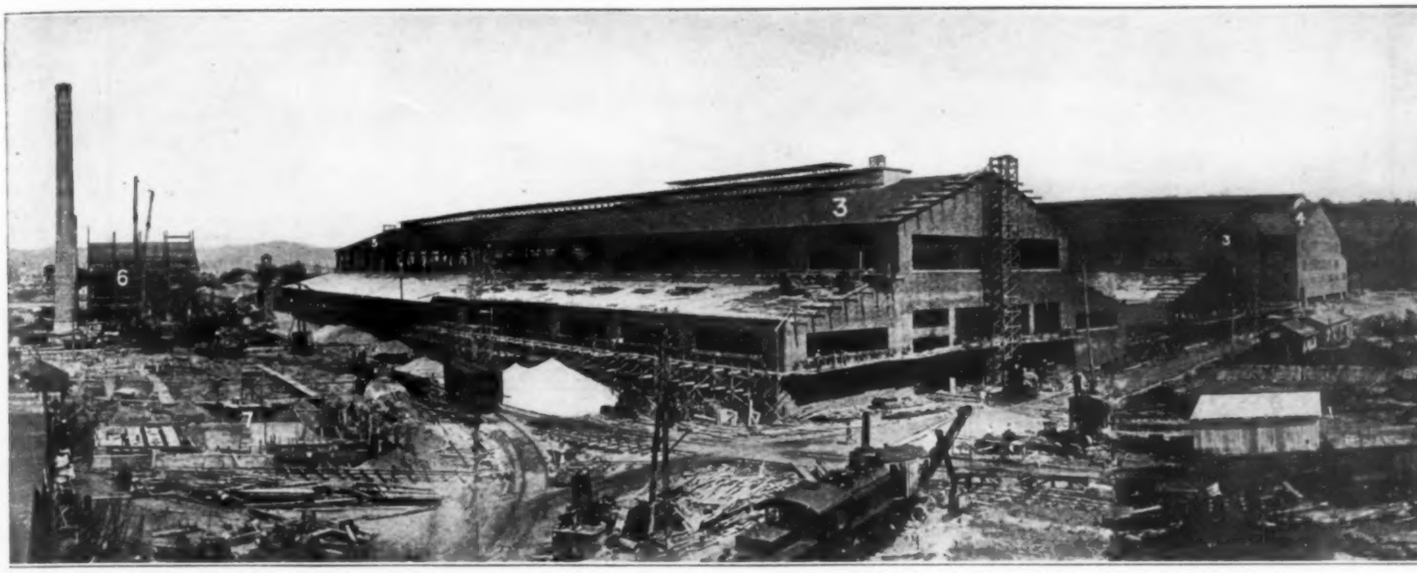
In general, the buildings consist of a structural-steel framework, unusually heavy on account of the size of the cranes on concrete foundations, some of which contain upward of 200 cu. yd. of concrete enclosed by walls of specially designed hollow red-tile building block, 5 in. by 12 in. by 8 in. Fifty per cent or more of the surface area of the walls is steel sash. The roof decks are of gypsum composition, cast in place and covered by waterproof roofing. In round numbers about 50,000 cu. yd. of concrete has been placed in the various foundations, 25,000 tons of structural steel erected, and in excavation and grading upward of 500,000 cu. yd. of earth moved. The total area under roof is approximately 700,000 sq. ft. for the main buildings alone.

TRANSPORTATION FACILITIES

It was evident very early in the design period that one of the most important features of the entire plant would be the arrangements for efficiently handling and moving unusually heavy and awkward loads. For example, one armor-plate ingot which will be made about six times a year will weigh upward of 400,000 lb., and tube forgings for the major-caliber guns will weigh up to possibly 100,000 lb. and run in length up to nearly 100 ft. An armor plate in the making must be handled something like fifty separate times and as the average weight of the finished plates is in the neighborhood of 50 tons, very special attention was required in the design of the electric traveling cranes and in the railroad-track system.

The railroad system, which totals something over seven miles in length, is outlined on Fig. 2. A classification yard of ten tracks including incoming and departure tracks has been provided. Pro-

[1] In the background toward the north may be seen the projectile plant with the barracks for the construction forces in the foreground. In the immediate foreground is the main track crossing the upper dam of the reservoir. Immediately in front of the machine shop is the oxy-hydrogen building and gasometers in process of construction. To the right of the machine shop is the concreting plant for the gun-treatment pit, only a portion of the steelwork having been erected. The steelwork for the high portion, when completed, will reach a point three times the height of the adjacent parapet wall of the machine shop, i. e., somewhat over 200 ft., and somewhat higher than the twin chimneys for the boiler plant shown in the middle of the photograph. The fill for the shuttle track is shown leading from the forge shop to the south side of the machine shop. Note the open monitors on the low and high portions of the forge and furnace building. The photograph was taken from a position near the middle of the railroad "Y" which is at the approximate center of the reservation.



ton, W. Va.; View Looking in a General Eastwardly Direction, August, 2, 1920

ing; 4, Open-Hearth Building; 6, Boiler House; 7, Foundations for Service Building.

visions have been made for tracks entering into either end of practically every crane aisle. A complete loop-within-loop system has been developed so that a wreck or stoppage on any main track will not hold up the operation of the plant or of any individual major building. A three-way reinforced-concrete approach trestle will lead to the charging-floor level of the open-hearth building.

The major specifications of the twenty-three overhead electric traveling cranes are given in Fig. 3. Each main aisle of the four main buildings is provided with erecting girders for the cranes located in the roof trusses.

While by far the larger portion of the traffic at the plant will be by rail, a system of concrete roads 20 ft. in width has been developed in order to provide auto-truck service to all main buildings, and for employees. The main entrances to both the north and south units will be from Eighth Avenue, where the plant railway crosses. A central receiving building with a special siding has been built near this point as shown on Fig. 2, for the unloading of less-than-carload shipments and to permit distribution by auto truck.

Open-Hearth Building

The unusual features of the open-hearth at the Ordnance Plant consist of the arrangement of the stock yard alongside the building, the 100-ft.-wide pouring aisle with exceptionally heavy cranes, the arrangement for "duplexing" by placing the electric furnaces in the pouring aisle and the dump trestle and storage bins in the crane-served charging aisle.

Figs. 4, 5 and 6, inclusive, show the general arrangement and give the important dimensions of the building which, including the stock yard, is 331 ft. wide by 516 ft. long.

The charging floor of the open-hearth building has been designed to withstand a load of 800 lb. per sq. ft. It extends 30 ft. out under the crane runway of the stock yard to form a charging platform. Two parallel tracks are arranged upon this charging platform with cross-overs conveniently located, and a turn-out leads to the charge track directly in front of the open-hearth furnace doors.

A track connected at both ends to the main system runs through the stock yard at the ground level adjacent to the charging platform. Materials for the charge, such as scrap, pig iron, etc., received on this track can be unloaded directly by the stock-yard cranes by magnet and placed in charging boxes on charging cars on the charging platform. These cars will be made up into trains, each containing a complete charge for an open-hearth furnace, or the incoming cars of material may be unloaded directly into the stock piles. The charge train will be shifted by an electric storage-battery locomotive over the scale, located near the entrance to the charging aisle, directly to the track in front of the open-hearth furnace doors and into position for the charging machine to start charging the furnaces. The empty train of charging boxes will be shunted back to the charging platform over the same track it entered, or out of the building at the east on to the trestle and back.

The charging floor carries three tracks, two of standard gage which are connected into the three-way approach trestle at the east of the building, and the third of 24 ft. 6 in. gage for the low-type charging machine. The floor is paved with brick. The charging track is located directly in front of the furnaces and the so-called "hot-metal track" is at the far side of the aisle. This track originates in the approach trestle and continues at the east end of the building over a series of concrete bins arranged so that cars of material can be bottom-dumped. The track then leads to the main charging floor where it will be used for handling materials with which to repair the furnaces and thus avoid interference with operation.

Space has been provided for three 65-ton open-hearth furnaces, two of which are now being completed. An electric traveling crane of 25 tons capacity with an auxiliary hoist of 10 tons capacity serves the entire length of the charging aisle.

Underneath the charging floor and back of the open-hearth furnaces is the pit for the checker chambers enclosed by a reinforced-concrete retaining wall. The lean-to contains the offices, the quick-test laboratory, chimneys, storage areas, lockers, toilets, etc.

The pouring aisle is served by three electric traveling cranes, specifications for which are given in Fig. 3. The distance from the center to center of crane runway rails is 100 ft. Jib cranes of 6 tons capacity with a radius of 25 ft. are mounted on main building columns adjacent to the open-hearth furnaces for handling the spouts.

The unusual width of the pouring aisle was to give space in the open-hearth building for the storage and chipping of ingots, and on account of the large pouring pit in which it is planned to ash-anneal the ingots. The location of the electric furnaces for duplexing in this aisle was an important factor in determining this width.

The pouring pit is divided for convenience in operation into two levels and is of reinforced concrete lined with 13 in. of red brick. The lower level is 16 ft. below the floor, 30 ft. wide and 93 ft. long and the upper level is 8 ft. deep, 30 ft. wide and 46 ft. long.

For open-hearth steel the furnaces will be tapped into the ladles and carried directly to the pouring pit and bottom-poured directly into the ingot molds. In obtaining electric steel by duplexing, the open-hearth furnaces will be used simply for melting the charge, which will be tapped into ladles and then carried down the shop to charge the electric furnaces.

Two 30-ton Heroult electric furnaces have been erected as shown in Fig. 5 on independent concrete foundations, and are surrounded

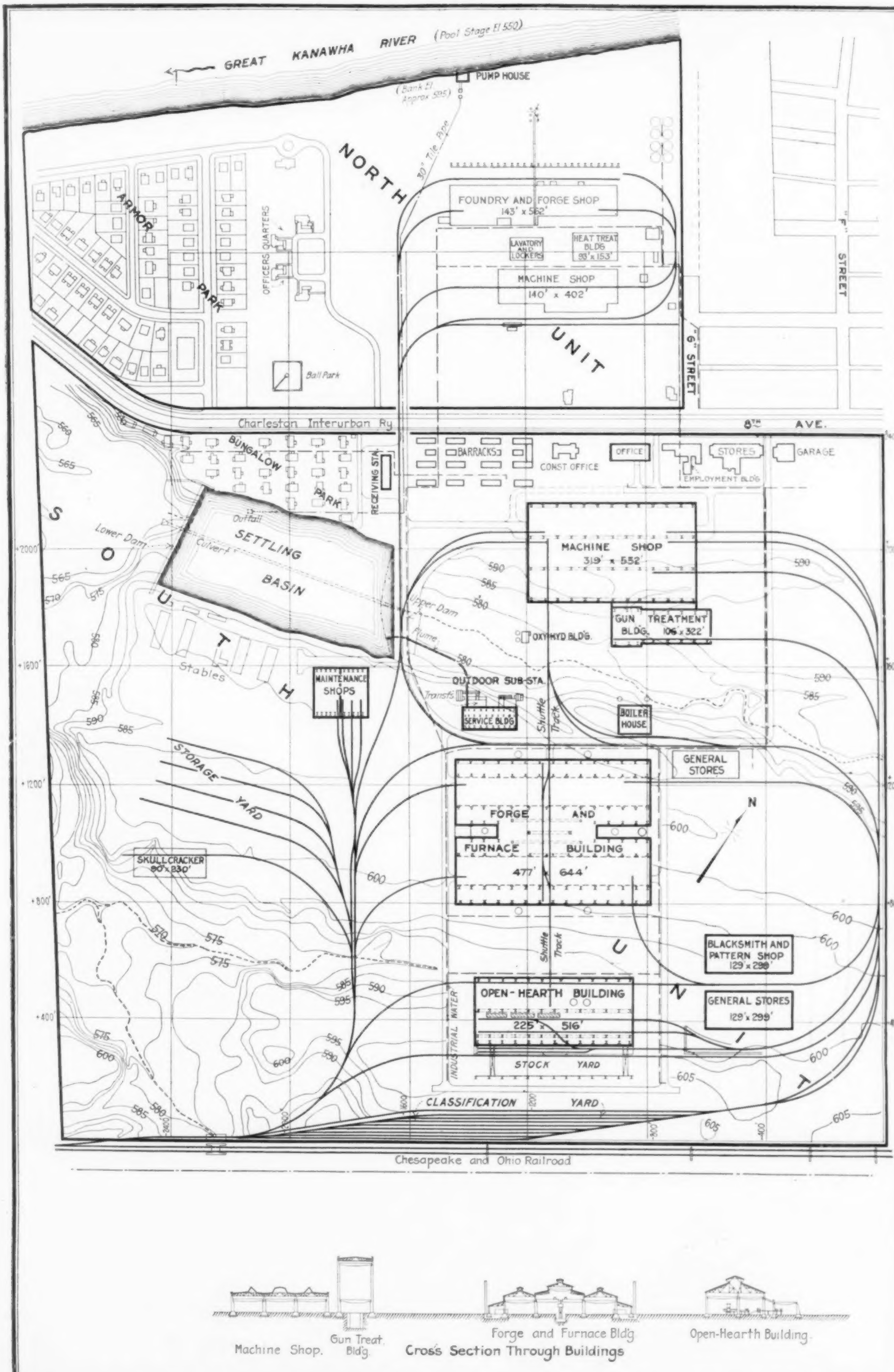
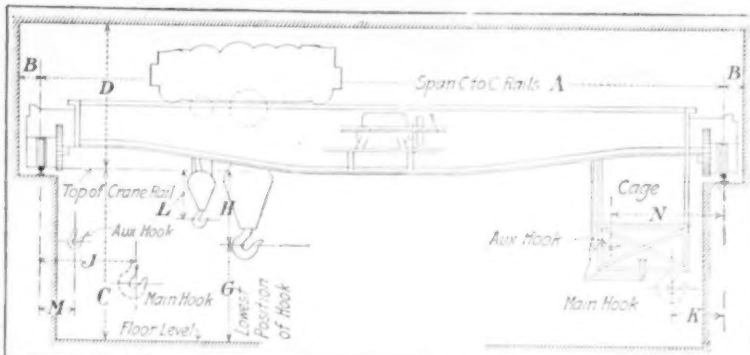


Fig. 2 General Layout of Plant Showing Track Plan

by a charging platform which is an extension of the charging floor and on which are placed the transformer houses. Flux material will be brought over to this floor from the bins in the charging aisle. The furnaces will be charged from the rear. The capacity of one open hearth is sufficient to charge the two large electric furnaces. After the refining process, a ladle will be brought close into the front of the electric furnace by lifting a large trap door, the furnace tilted forward and the contents discharged into the ladle, which will then be carried back to the pouring pit and the molten steel will be bottom-poured into ingots in the usual manner.

In casting the largest ingot, the open-hearth furnaces will be overloaded to 80 tons each and will be brought out at the same time as one or both of the 30-ton electric furnaces overcharged if required.

Tracks enter the pouring aisle at either end for a length of one or two car lengths and the south end of the shuttle track is at the middle of the building adjacent to the pouring pit, conveniently located for the transportation of ingots to the forge shop.



CRANE NUMBER	OPEN-HEARTH CRANES 1	2	3	4	5, 6	FORGE AND FURNACE BUILDING 7, 8	9, 10	11, 12	13, 14	15	MACHINE SHOP 16, 17	18, 19, 20, 21	HEAT TREATMENT 22	23, 24
LOCATION	O.H. POURING SLIDE	O.H. POURING SLIDE	O.H. POURING SLIDE	O.H. CHARGING SLIDE	STOCK YARD	MAIN AISLE	MAIN AISLE	PRESS ROOM		PRESS ROOM				
CAPACITY (NET TONS)														
MAIN HOIST	250	125	75	25	15	200	100	250		75	150	75	75	NO 21
AUXILIARY HOIST	40	25	15	10	NONE	25	25	25		15	25	15	NONE	
SPEED (FT PER MIN)														NO 20
MAIN HOIST	10	10	14	23	50	8	10	7		14	10	14	[illegible]	
AUXILIARY HOIST	20	23	30	30	0	23	23	30		30	23	30	0	NO 19
BRIDGE	200	200	200	250	300	200	200	150		200	200	200	100	
TROLLEY	75	75	100	150	150	75	100	50		70	100	100	50	NO 18
CRANE RAILS	175 LB LORRAINE STEEL CO			80 LB ASCE		175 LB L.S. Co		[illegible]		175 LB LORRAINE STEEL CO				
CLEARANCES														
A	100'-0"	100'-0"	100'-0"	80'-0"	100'-0"	100'-0"	100'-0"	70'-9"		70'-0"	100'-0"	100'-0"	104'-0"	SAME AS CRANES
B	1'-10¾"	1'-10¾"	1'-10¾"	1'-3¼"	1'-2"	1'-10½"	1'-10½"	2'-10"		2'-9"	1'-10½"	1'-10½"	1'-0½"	
C	55'-0"	55'-0"	55'-0"	54'-10¼"	38'-0"	40'-0"	40'-0"	46'-9"		73'-0"	40'-0"	40'-0"	165'-0"	
D	19'-0"	19'-0"	19'-0"	19'-1¼"	12'-0"	19'-0"	19'-0"	21'-0"		3'-6"	17'-6"	17'-6"	15'-6"	
G	53'-0"	40'-0"	43'-0"	53'-10¼"	38'-0"	37'-0"	38'-0"	25'-0"		76'-0"	37'-0"	38'-0"	165'-0"	
H	2'-0"	15'-0"	12'-0"	1'-0"	1'-0"	3'-0"	2'-0"	21'-6"		0'-0"	3'-0"	2'-0"	0'-0"	
J	3'-6"	7'-0"	7'-0"	6'-0"	3'-6"	9'-3"	7'-6"	3'-0"		7'-0"	8'-6"	7'-0"	10'-0"	
K	9'-0"	8'-0"	7'-0"	4'-0"	3'-6"	10'-0"	5'-0"	5'-0"		6'-0"	7'-9"	6'-0"	10'-0"	
L	0'-0"	0'-0"	0'-0"	0'-0"		0'-0"	0'-0"	26'-6"		0'-0"	0'-0"	0'-0"		
M	3'-6"	7'-0"	3'-6"	3'-6"		3'-6"	3'-6"	7'-0"		3'-6"	3'-6"	3'-6"		
N	14'-0"	6'-0"	6'-6"	6'-6"		15'-9"	9'-0"	7'-0"		9'-6"	12'-9"	9'-6"		
REMARKS		FOUR SHEAVE LADLE CRANES			CAGE AT CENTER OF SPAN			HYDRAULIC HOIST TUMBLING BLOCK [illegible]		VERTICAL LIFT			REMOTE CONTROL	

FIG. 3 SPECIFICATIONS FOR ELECTRIC TRAVELING CRANES

Attention is invited to the runway escape platform for the crane operators at the level of the bottom of the crane cages, also to the provision in the structural design for ventilation. The entire wall area of the building is left open to a distance 8 ft. above the ground, although arrangements are made for vertically lifting doors in case of severe weather. The sides of the large monitor are left entirely open and without louvers, high curbs being provided on the main roof and the overhang of the monitor roof being made excessive for protection against the weather.

FORGE AND FURNACE BUILDING

The design of the forge and furnace building of the U. S. Naval Ordnance Plant is believed to be a radical departure from anything that has been built for the purpose.

The forge shops of the existing armor plants consist of buildings with one main crane aisle and a lean-to on one or both sides. The furnaces are located in the lean-tos, the presses in the middle or at one end of the main aisle.

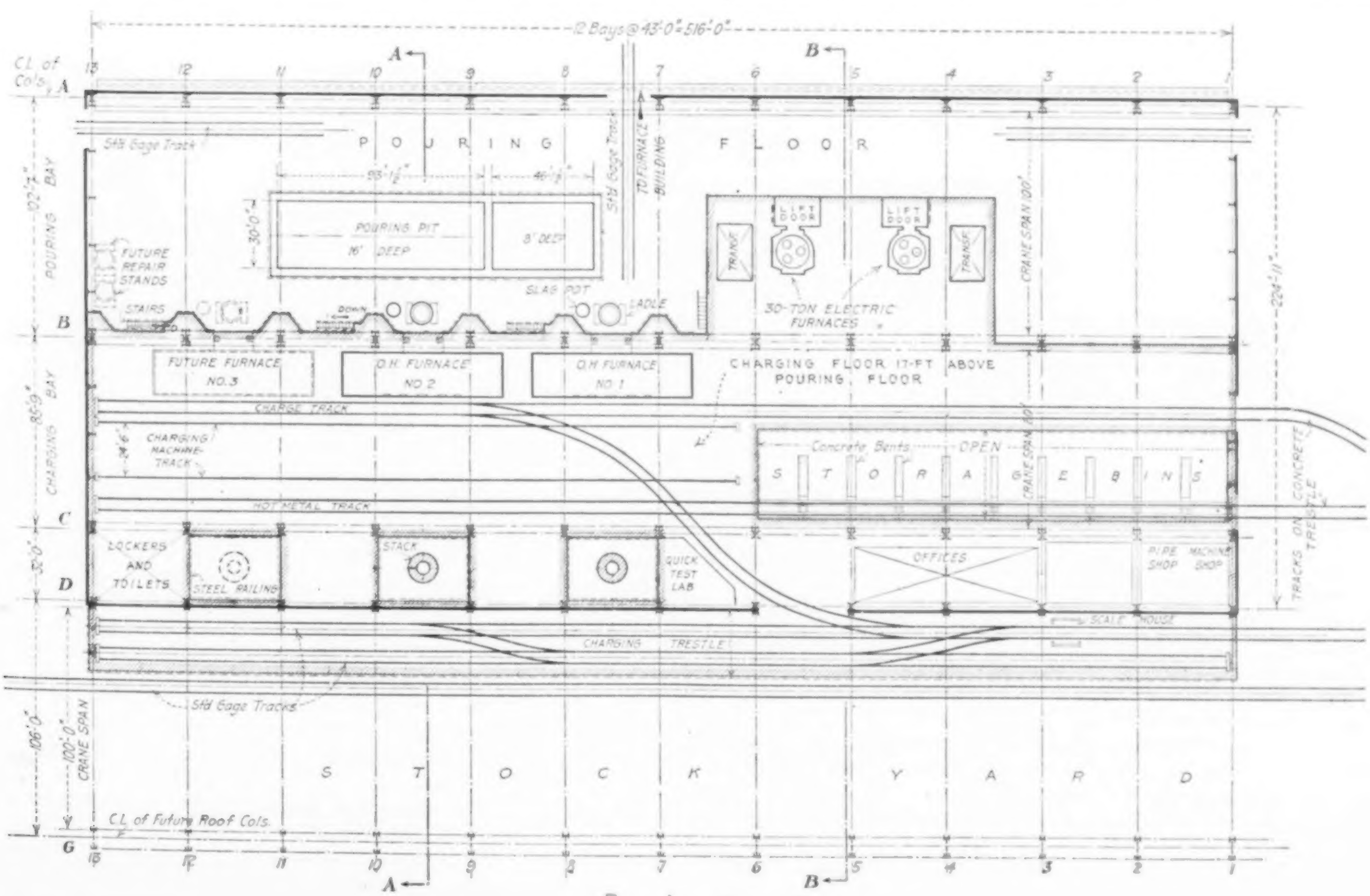


FIG. 4 FLOOR PLAN OF OPEN-HEARTH BUILDING

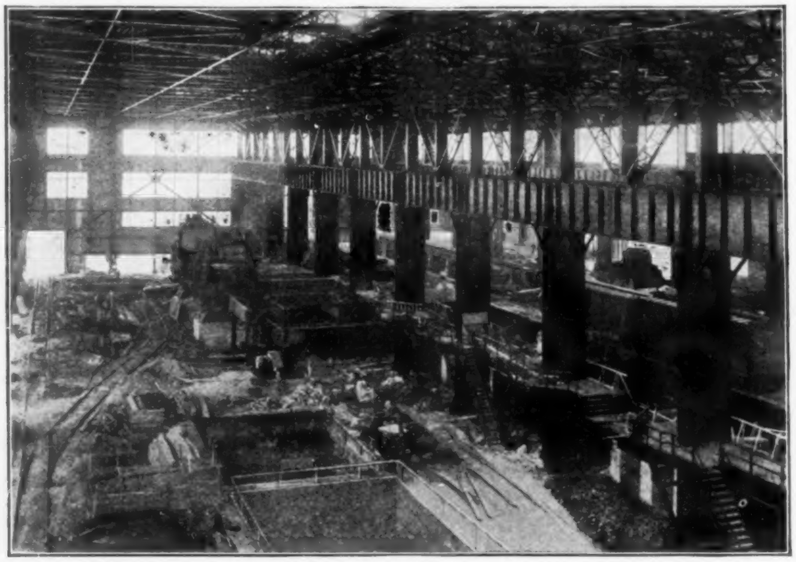


Fig. 5 Pouring Aisle of Open-Hearth Building Looking East from Crane Girder, July 14, 1920

Casting pit is in immediate foreground. Electric furnaces just beyond. Charging floor, when completed, will extend completely around furnaces. Locations for open-hearth furnaces 1 and 2 are shown to the right just behind middle row of columns. Box cars on charge track of charging aisle indicate scale. Crane span of charging aisle is 100 ft. wide.

Forging cranes are provided on either side of the press on crane rails which at one end of the span are supported on the top of the press and at the other end on separate steel structures. Forging heats are brought from the furnaces down the main aisle by the overhead cranes and placed in a position where they can be picked up by the forging cranes, although in certain cases the ingot furnaces are in direct reach of the forging cranes. In order that the presses and the forging cranes may be cleared, the overhead crane in the main aisle must be placed at a relatively great height above the ground. This makes an expensive building.

The treatment shops of the existing armor plants are located in separate structures from the forge shops, and as plates must be returned to the press for bending, straightening, etc., considerable railroad traffic between the two buildings results, unless two very large presses are provided.

At the Naval Ordnance Plant the forge shop and the treatment shop for both armor plate and gun forgings have been consolidated in the "H"-type forge and furnace building. The general arrangement is shown by Figs. 7, 8, 9 and 10. The overall dimensions of the building are 644 ft. by 477 ft. The building consists of two main aisles, each of which has a lean-to on either side and which are connected by the press room which forms the cross-bar of the "H."

The 14,000-ton steam-intensified hydraulic forging press and its driving equipment, including the 2500-lb. hydraulic-pressure pumps, the 32-in. accumulator and the steam receivers and intensifiers, is located in the eastern half of the press room as divided by the shuttle tracks. (Fig. 11.) The 6500-ton press which will be erected in the future will be located in the western half.

The direction of the forging is from the south aisle toward the north aisle. A 250-ton hydraulic forging crane with an auxiliary hook of 25 tons capacity is located on either side of the press on double runway rails 46 ft. above the floor. The inside runway rails are supported directly on top of the press. These forging cranes, of which all the motions excepting the hoisting motions are electrically driven, have a sufficient range of bridge travel to pick up loads from either of the shuttle tracks. Water is supplied to the hoist motions from the pressure system at 2500 lb. per sq. in.

The entire area of the press room proper, which is approximately 140 ft. wide by 160 ft. long, has been made entirely free from columns except for the row necessary to support the inside crane runway rails for the forging cranes. The central area over the presses is served by a 75-ton crane located on rails approximately 80 ft. above the floor level. This crane has been placed to serve in the erection of the presses and of the forging cranes as well as in their repair. The span of the runway girders is 140 ft. The track scale of 600,000 lb. capacity is located on the main shuttle track in the northern half of the press room.

Briefly and generally the process for armor-plate manufacture in this building will be as follows: The ingot will be received in the south aisle from the open-hearth building on a flat car by way of the shuttle track. It will be lifted by an overhead crane and placed in one of the ingot furnaces by means of a porter bar. To heat the ingot will require up to 20 hr. The hot ingot will then be withdrawn from the furnace and carried down the aisle to either one of the shuttle tracks and deposited on a car which will then be pushed through the few feet necessary by an electric locomotive into the press room. It will be picked up by a forging crane and carried under the press.

The first forging operation will last about an hour. It will bring the plate down within an inch or so of its finished thickness and will include cropping the ingot. The plate, which is then 35 per cent lighter, is returned to the south aisle, deposited on the

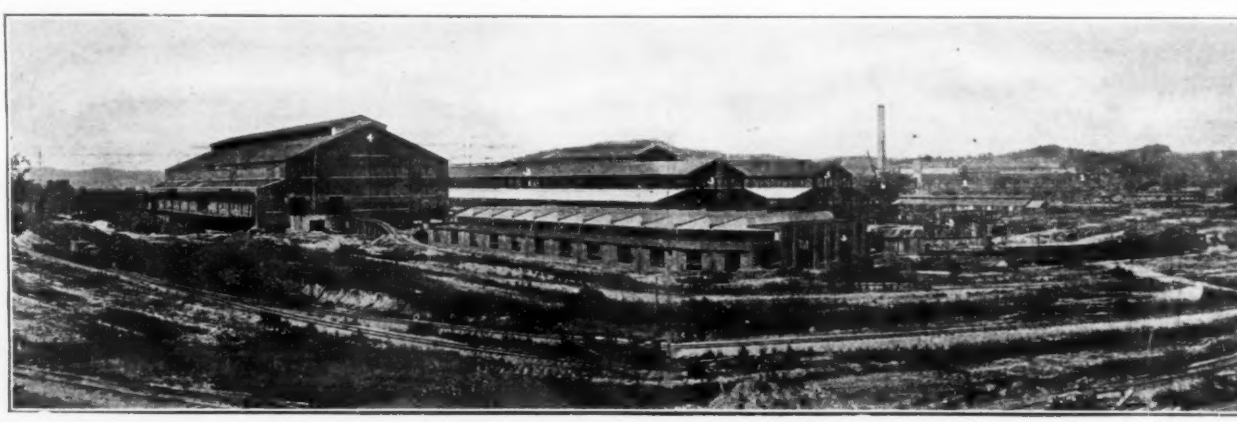


Fig. 6 Open-Hearth Building from Southeast, August 2, 1920

Alongside the Open-Hearth Building is the stockyard with 100 ft. crane span. Classification yard is to extreme left. Note track doors at charging-floor level. Three-way concrete trestle will replace temporary wooden trestle. In immediate foreground is general storehouse and blacksmith and pattern shop (No. 5). Twin buildings each 130 by 300 received through Army salvage.

car of one of the Carbottom type reforging furnaces, which will then be rolled into the furnace and the plate will be reheated preparatory to reforging. After reforging and rectifying, the plate will come out into the north aisle for the carbonizing, annealing, tempering and hardening operations, and under normal conditions will not return again to the south aisle although returning occasionally to the press room, as required, for bending and straightening. It then goes via shuttle track to the machine shop.

The "H" type of building consolidating the forging plant with the treatment building presents the following main advantages:

(*a*) A low first cost. An estimated saving of half a million dollars was secured by keeping the height of the runway rails in the main aisles down to 40 ft.

(*b*) The maximum economy of space secured by consolidating the forge and treatment operations in one building.

(*c*) The maximum economy in operation should result, due to the compactness of the building itself, the relatively short haul from any furnace to the press room, and the time saved over present methods in operation.

(*d*) The presses are very accessible to the furnaces and any press can receive work directly from any furnace in either aisle.

(*e*) Operation of cranes in the furnace aisles will not interfere with or be interfered with by forging operations in the press room.

(*f*) Operating conditions are ideal in so far as light and ventilation are concerned.

Fig. 8 Forge and Furnace Building, South Aisle, Looking North-east from Crane Girder, July 12, 1920

Deeper crane girders in left foreground and heavy columns are at 70-ft. spans where cross-tracks will lead to press room on left.

(*g*) The presses and press-drive equipment are concentrated in a central area, thereby avoiding any expensive distribution systems for steam, high-pressure water or electricity.

Furnaces. Twenty-five furnaces are being completed in the

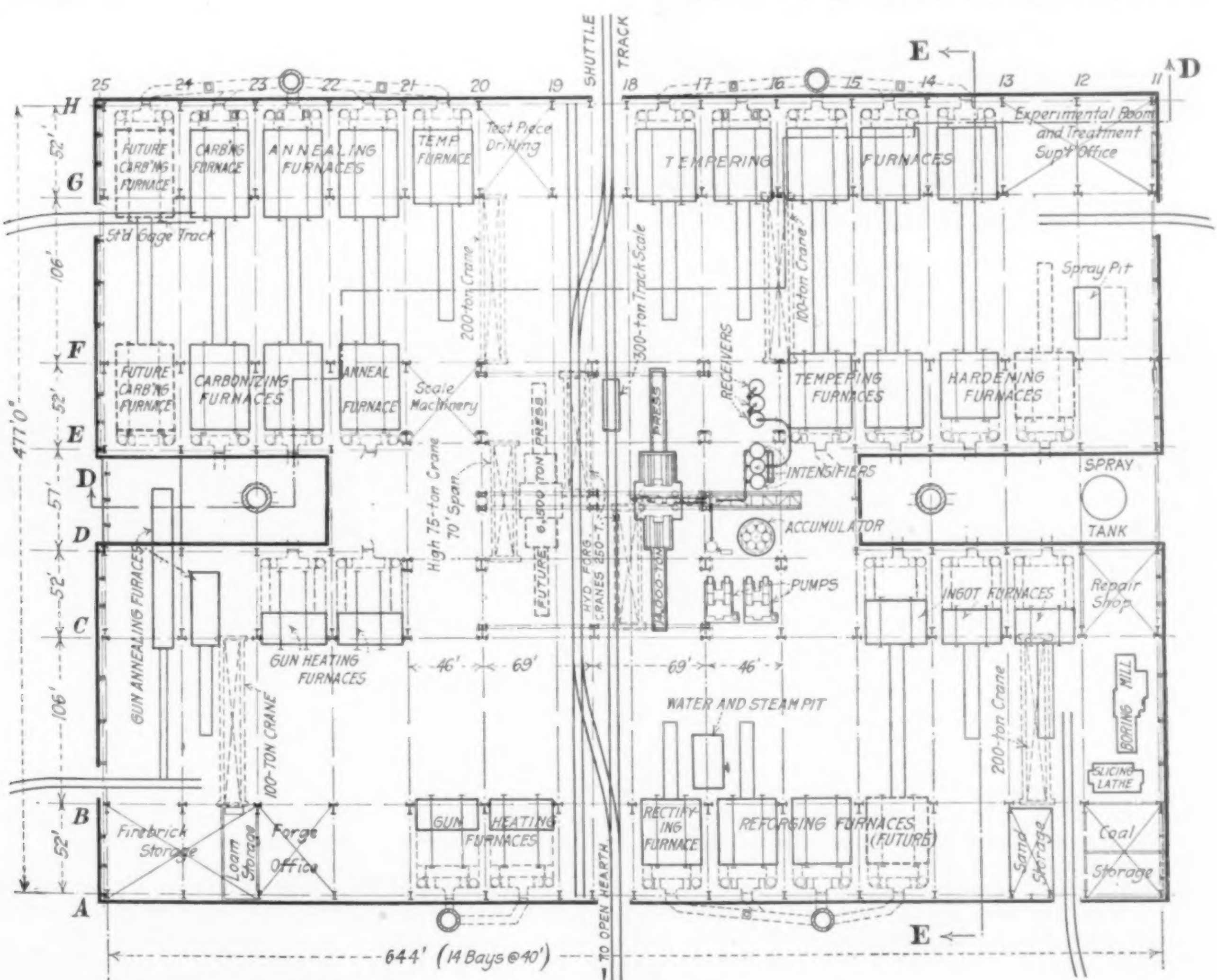


Fig. 7 Floor Plan of Forge and Furnace Building

forge and furnace building. Of these the three ingot furnaces, the two reforging furnaces and the rectifying furnace in the south aisle; the three carbonizing, three annealing, eight tempering and one hardening furnace in the north aisle are identical in section and differ only in length. They are of the regenerative Carbottom type, the fuel is natural gas, and the air preheated. There are three different lengths of furnace, 50, 42 and 36 ft., respectively. The height inside from the floor line to the top of the underside of the arch is 14 ft. 6 in. and the width inside from face to face of the brick work 15 ft. in each case. The general arrangement is shown in Fig. 10.

An interesting feature of the furnace equipment is the car-pulling mechanism. Having in mind the "electric mules" which

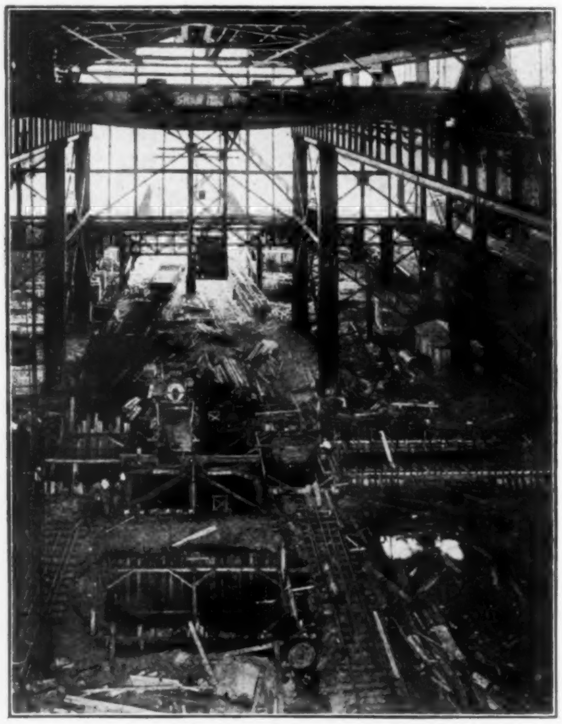


Fig. 9 Press Room, Forge and Furnace Building, Looking East from Crane Girder, July 16, 1920

Foundations for 14,000-ton press in middle foreground. In immediate foreground is excavation for double column which will support inside crane girders running directly across the top of the press. Note high crane for erection and repair of press and forging crane. Note double rails on outside girders for forging cranes. Intensifiers will be located at position of locomotive crane and an 32-in. accumulator where sand pile is shown.

draw the ships through the locks at Panama, the idea was conceived of using an independent portable electric-driven rack-rail locomotive which would operate on standard-gage tracks placed between the Carbottom tracks and which would draw the Carbottom by means of a standard M.C.B. coupling. A spring reel of cable was arranged for plugging in to the nearest electric power socket and rings were provided for conveniently lifting and carrying the mule to any furnace desired by the overhead crane. The device has subsequently been altered by the operating division to exclude the standard-gage track and wheels, and as built the car-pulling mechanism will be carried on an extension of the girders of the Carbottom furnaces.

The green-annealing furnaces for gun forgings, one of which will be 100 ft. long, are also of the Carbottom type. The balance of the furnaces are of the solid-bottom type. Six radial-brick chimneys with independent firebrick linings are being erected to serve the furnaces by groups.

Forging Press. The forging press is of 14,000 gross tons capacity and is of the steam-intensified hydraulic type. The maximum working stroke is 90 in. and the four press columns are 19 ft. by 8 ft. 6 in. on centers. The columns are each 30 in. in diameter. There are three cylinders each 44 in. in diameter and the working pressure is 7000 lb. per sq. in. There are two double-acting manipulating jacks in pits on either side of the press, each of 150 tons capacity and having a maximum stroke of approximately 18 ft. Valves are arranged so that one forging cylinder alone may be used, giving greater speed for forging gun work under these conditions. Water is supplied at 2500 lb. pressure by three 250-gal.-per-min. pumps. A 32-in. accumulator operates on this system which also supplies the manipulating cylinders, pull-back plungers and the 250-ton hydraulic forging cranes. The triple intensifier operating on steam at 200 lb. pressure from the boiler plant, increases the pressure in the press cylinders to 7000 lb. per sq. in. The general arrangement is shown in Figs. 9 and 11.

As a matter of general interest, the total weight of the press alone is nearly 5,000,000 lb. The total load at the bottom of the foundation, assuming both cranes loaded directly over the press and including the dead weight of the press and of the concrete foundations is approximately 13,000,000 lb. To support this load it was necessary to place the press on four concrete piers, each 9 ft. in diameter, which bear on rock about 60 ft. below the level of the press-room floor.

Under conditions of eccentric loading there is an extremely remote possibility that a very great side thrust may occur at the top of the press. At the insistence of the manufacturer, a structural-steel brace was designed to take this load, as is shown in the section of the press room (Fig. 11).

All motions of the presses and jack are controlled from a pulpit located on the floor of the press room on line with the press and about 15 ft. away. The hoist motions of the 250-ton hydraulic cranes are also controlled at this point. The bridge and trolley motions of the crane are controlled from cages mounted at the far end of each forging crane whence the operator can most readily line up the piece in the press.

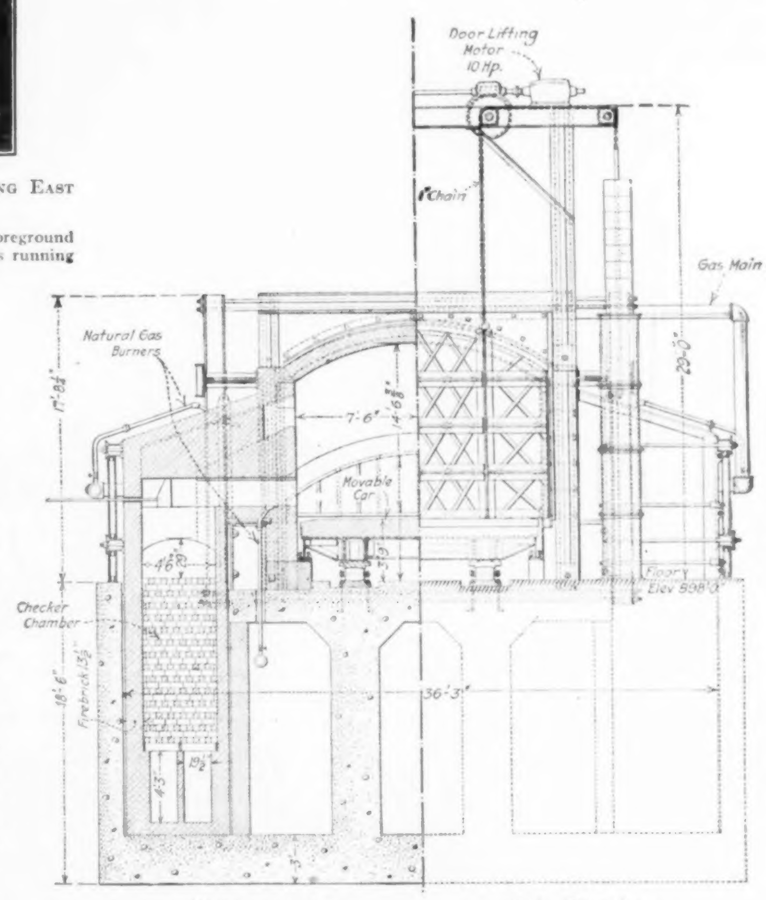


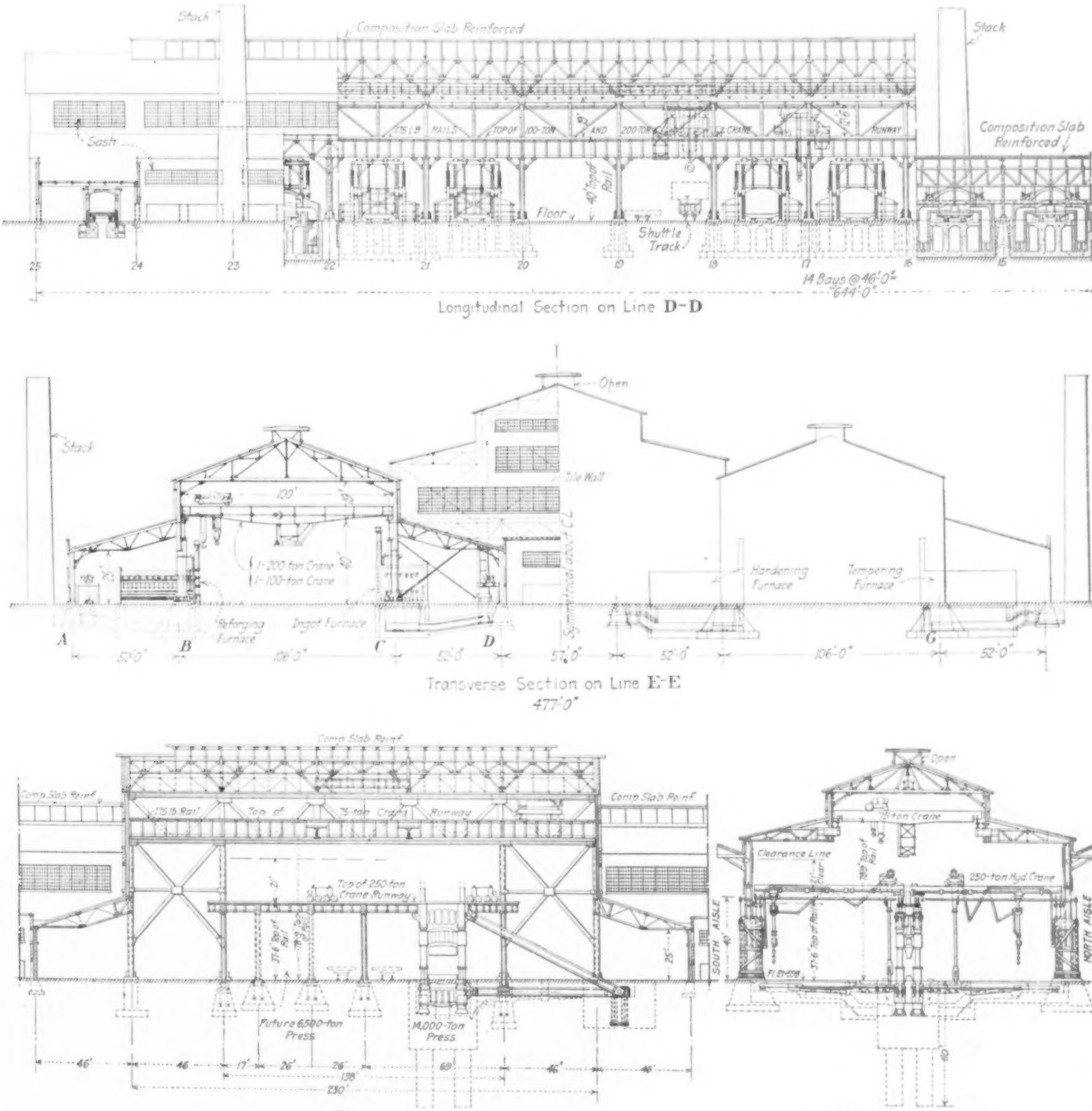
Fig. 10 Section and End View of Carbottom Furnaces for Armor Plate

The spray for quenching armor plate is placed at the east end of the north aisle. This consists of a reinforced-concrete pit 16 by 32 ft. by 8 ft. deep. The bottom is covered by a grillage of small pipes perforated with 1/4-in. holes. A carriage on tracks carrying a like grillage straddles the pit. The plate is taken from the Carbottom hardening furnace nearby by a crane and placed on suitable supports in the pit. The carriage is then moved over it and the plate drenched on either or both sides with water. Approximately 25,000 gal. of water per min. are required during the first twenty minutes of the operations. The water from the spray is wasted into the adjacent gully.

Machine Shop

The general design of the machine shop is shown by Fig. 12. The building is 320 ft. wide by 552 ft. long. It comprises three main aisles, each of which is 100 ft. wide center to center of crane rails. Crane rails are 40 ft. above the floor level.

The south aisle and the middle aisle are to be used for the finishing of the armor plate. Each is served with a 150-ton and a 75-ton crane with 25-ton and 10-ton auxiliary hoists, respectively. The principal machine tools in the south aisle are four planers, two universal borers and drillers of the car type, two universal boring drilling and milling machines, a universal radial drill and two armor-plate grinders. At the west end of the south aisle will be located the burning equipment; gas will be piped from a separate oxy-hydrogen plant which has been built 100 ft. south as a matter of safety. At the west end of the south aisle is the erection floor and the surface plates for the fitting up of armor plate prior to



Longitudinal Section Showing Press and Crane Runways **Cross Section Showing Hydraulic Cranes**

FIG. 11 SECTIONS OF FORGE AND FURNACE BUILDING

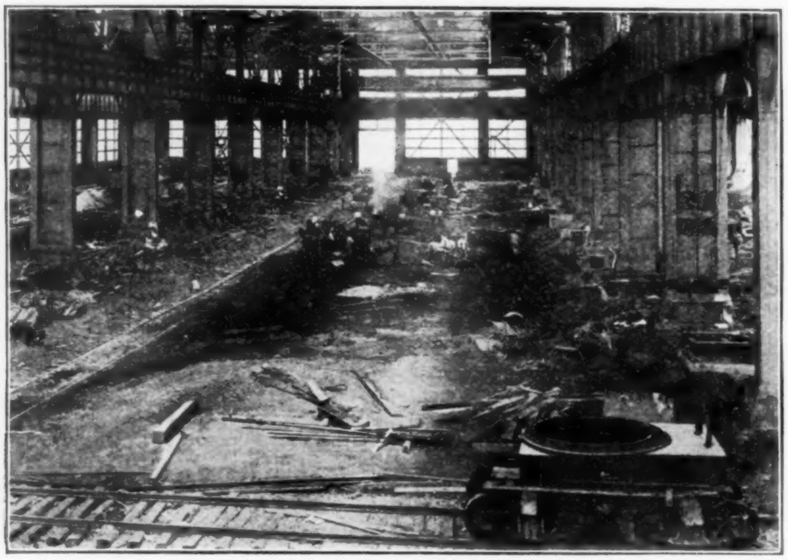


Fig. 12 Machine Shop, Middle Aisle, Looking East, July 20, 1920

Note lighting. Immediate foreground is location of shuttle track. Crane span 100 ft.; girders support one 150-ton and one 75-ton crane. Columns are 46 ft. on centers.

shipment. The erection floor will be 168 ft. long by 93 ft. wide and will consist of a thick reinforced-concrete slab with rails embedded in the surface. The surface plates cover an area 85 ft. by 48 ft. and are of steel. Special arrangements are made in the foundations so that an absolutely level surface may be accurately maintained.

The middle aisle contains an open-side planer, a vertical and horizontal planer, two armor-plate rotary planers and saws, a cutting-off machine and a double armor-plate breast planer. Offices and a tool room will be located in the farthest bay west.

The north aisle which is served by two 75-ton cranes will be devoted to the machining of gun forgings. Equipment of ample size to rough-bore and turn 20-in. 50-caliber gun forgings is provided.

The shuttle track ends in the middle aisle of the machine shop. Gun forgings from the forge shop will arrive by way of the main-track system in order not to make necessary swinging the great length of the forgings through 90 deg., although this can be very conveniently done if required, due to the 100-ft. width of the aisle. Railroad tracks enter both ends of the north and middle aisles and the east end of the south aisle. A track scale of 100 tons capacity is placed on the latter track.

Special attention is invited to the method of securing an abundance of daylight.

Somewhat over 60 per cent of the side and end wall area is in steel sash. Top lighting is provided by longitudinal sawtooth monitors in the side aisles and a double sawtooth monitor in the middle aisle. The construction is shown in Fig. 12.

Gun-Treatment Building

This building is located alongside the machine shop, the intervening space 40 ft. wide being roofed over to provide for lockers, toilets, offices and a two-story electric substation for the gun-treatment furnaces. Figs. 13 and 14 show the general arrangement of the building which consists of a low portion and a high portion. A railroad connection from the main-track system runs through the entire length of the building close to the south wall.

The low portion of the building provides space for a future straightening press, storage area for forgings, while awaiting treatment or result of tests, cutting-off saws and slotting and boring machines for the taking of test specimens.

The high portion provides for the vertical treatment of gun forgings. A reinforced-concrete pit approximately 80 ft. square and 55 ft. deep has been built and will contain the 10-ft. by 105-ft. vertical electric heat-treatment furnace and a quenching tank 10 ft. in diameter and 105 ft. high. A 50-ft. furnace is also to be erected on a line with the high furnace and the quenching tank. Space is provided in the pit and on the floor for a duplication of this equipment. Stuctural-steel platforms will be erected around the furnaces in galleries 10 ft. apart, for the convenient inspection of the forging in the furnace during operation through peep holes in the side of the furnace. The steel structure will also support the rolling doors which cover the top of the furnaces and the bridges from which the forgings are hung while in the furnaces. An interesting detail is the installation of an elevator to carry the operator from the bottom of the pit to any one of the ten galleries in the 105 ft. height of the treatment-furnace structure.

The reinforced-concrete pit is of unusually heavy construction in order to withstand the pressure due to its depth, and due to the additional 20-ft. head of water to which the bottom is subjected. The design is unique in that no interior cross-bracing whatever is used. Each of the four sides of the lower half of the pit is designed as a slab supported between the bottom of the pit and a flat horizontal beam at approximately one-half the total depth. The upper half of the walls are designed as retaining walls, for which the flat beam forms the base. Special precautions were taken in the construction of the pit to secure watertightness and the entire concrete work was divided into units each consisting of one full day's pouring of concrete, metal water stops being provided at each construction joint and also where the needle beams of the shoring pass through the wall.

The high portion is served by a 75-ton crane with a 104-ft. span which has a 50-ft.-per-min. hoisting speed at full load, and a 100-ft.-per-min. lowering speed. All motions of this crane are controlled from a pulpit located on line with the quenching tank and at a height just above the top of the furnaces and tanks, on the east wall of the high portion of the building. The furnaces are placed on line with the tank so that only a hoist and a trolley motion will be required in the quenching operation.

The low portion is served with two cranes which are duplicates of the machine-shop 75-ton cranes. The runway of the low por-

Fig. 13 Gun-Treatment Building, Gun Pit in Foreground, July 12, 1920

Note concreting plant to pour 5000 yd. of concrete involved in pit. Sheet piles are 40 ft. long.

tion has been extended into the high portion so that pieces may be picked up and carried directly under the area served by the high crane and thus avoid an additional transfer by rail.

Plant Services

The service features of the plant include the industrial water supply, the sewerage, electrical power and lighting, steam, air, natural gas, etc. The electric, water and compressed-air systems are centered in the service building, which consists of two component parts, an outdoor substation and the service building proper. Electric power will enter the building at 6600 volts, 3 phase, 60 cycles and be distributed from the main buses to all buildings, and in addition, the d.c. feeders to the gun-treatment building. The second center is adjacent to the press room of the forge and furnace building and controls the hydraulic pumping equipment and the lighting for the building. The third center is under the charging platform near to the electric furnaces in the open-hearth building and controls the electric furnaces and the lighting in that building.

Adequate provisions have been made for secondary distribution systems, distributing centers for direct and alternating current, lighting, etc.

Water Supply. The industrial water supply is taken from the Great Kanawha River which flows west on the north boundary of

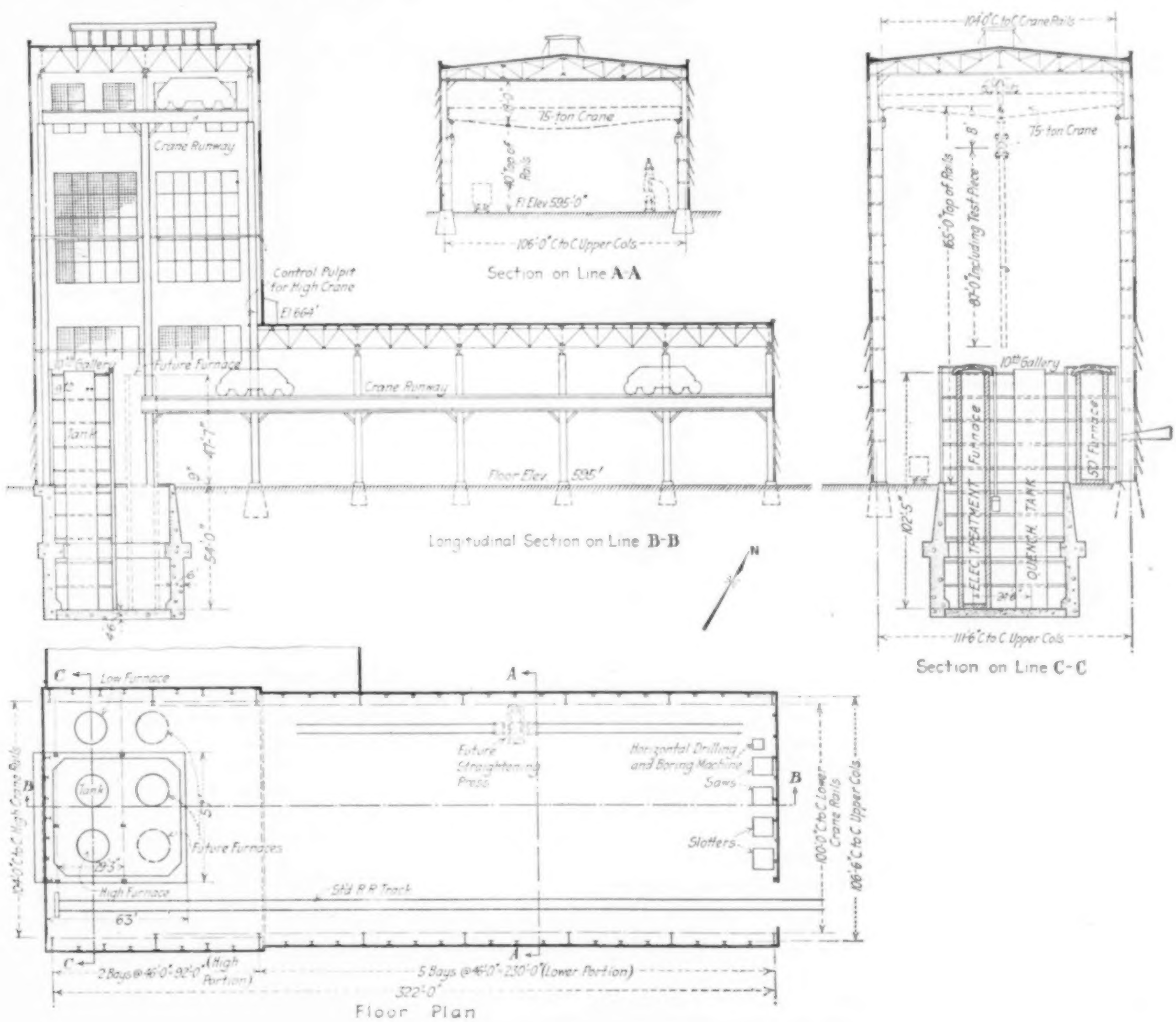


Fig. 14 Gun-Treatment Building, Plan and Sections

parts of the plant. The building houses four 1500-kw. rotary converters, synchronous condensers, three air compressors, six water pumps, various step-down transformers, necessary auxiliaries and the switchboards for controlling this equipment.

The outdoor electric substation is for the control of the two 44,000-volt and one 66,000-volt* three-phase 60-cycle incoming circuits and consists of 3 banks of transformers and the necessary switches, buses, grounds, and supporting framework.

In general, the electrical distribution system may be outlined as follows: For the distribution of alternating currents, three centers in addition to the main substation and the projectile-plant substation are provided. One of these is located adjacent to the gun-treatment building, in the west end of the lean-to between the heat-treatment building and the machine shop, and controls gun-treatment furnaces, lights, and 220-volt a.c. power in both the reservation. The river pump station is constructed of reinforced concrete directly in the river bank. Two 2000-gal.-per-min. pumps are being installed and space is provided for a third pump. The pump floor is underneath the river level and a positive head thereby assured. Occasional floods bring the river up to 30 ft. or in extreme conditions, 35 ft. The pumps raise the water approximately 50 ft. to a surge tank, whence it flows in a 30-in. tile pipe by gravity to the lower end of the reservoir settling basin. This basin has a capacity of 25,000,000 gal. As the maximum demand of the plant for industrial water is estimated to be approximately 5,000,000 gal. per 24 hr., the reservoir provides at least a five-day settling period for the raw river water.

The water is carried from the reservoir to the service building in a reinforced-concrete flume where the distributing pumps are located in a pump pit which insures a positive head for the pumps.

Distribution is at 60 lb. pressure. As an additional precaution in the remote case that the spray pumps should fail to operate immediately, when the plate was placed in the spray pit for quenching, a standpipe 25 ft. in diameter and 100 ft. high is being provided in the east court of the forge shop.

A separate city water system has been provided to supply water for drinking and lavatory purposes. This water will also be used for 2500-lb. pressure water at the hydraulic press and forging cranes.

Sewerage. Sewerage, waste water and in certain cases, roof water, are gathered from branch systems into the trunk line which, along with the other distribution systems of the plant, including gas, water and electrical conduit, follows the general line of the main west road and the main railroad track across the upper dam and ultimately reaches an outfall several hundred feet below the river pump station. The trunk line is 24 in. in diameter.

Compressed Air. Compressed air is piped at 100 lb. pressure

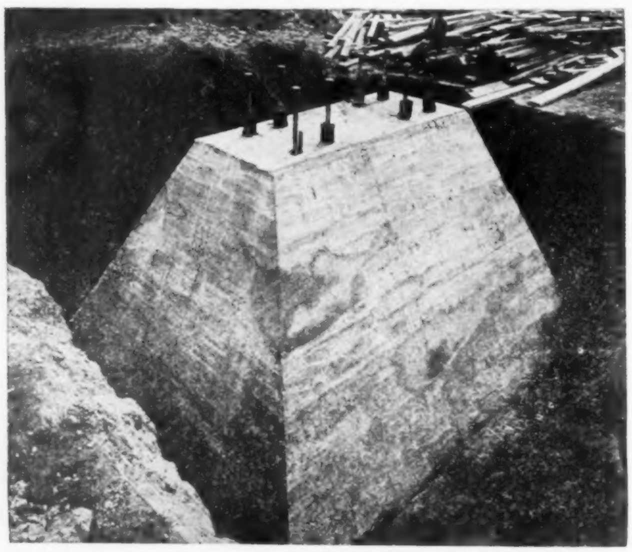


Fig. 15 Typical Column Footing for Row F, Forge and Furnace Building, August 29, 1919

172 cu. yd. concrete. Note man in background.

from the service building to the main buildings in a loop system, large quantities being used in the open-hearth, forge shop and machine shop, and also in the blacksmith shop, where air will be used to operate the hammers. A complete loop system is provided.

Natural Gas. Natural gas is obtained from the fields some miles away and will be delivered at the plant at 50 lb. pressure. A loop system is provided with reducer valves located at convenient points throughout the plant. The largest quantities are, of course, used in the open-hearth furnaces and in the furnaces in the forge and furnace building. In the latter building a double loop is provided and meter houses are arranged so that the quantities of gas used in the forge shop and in the treatment shop may be measured separately. The natural-gas supply may be exhausted, it is believed, within the course of the next ten years and with this in view necessary provisions have been made for double checker chambers for the open-hearth furnaces in case producer gas must be resorted to. The use of pulverized coal as a fuel was also in mind when the foundations for the furnaces were designed. Space which was left for double checker chambers can be equally well used for ash baffles.

Boiler Plant. The question of providing the best method of drive for the 14,000-ton hydraulic press and additional capacity to operate a stand-by power plant of generous proportions and take care of the heating of the machine-shop and gun-treatment buildings was gone into very thoroughly and a most interesting method of adapting the reversing rolling-mill drive system to a pressure pump to work momentarily against 7000 lb. per sq. in.

Eight 823-hp. Stirling boilers were obtained from the power plant of the Old Hickory Powder Plant at Nashville, Tenn., and also a separate building of sufficient size to house them. They are arranged four on a side facing each other. The automatic stokers are fed from an overhead concrete bunker of approximately 1000 tons capacity. This in turn is filled by a bucket conveyer from a hopper and crusher located under the railroad siding at the end of the building. The operating floor of the boiler plant is 17 ft. above the ground level so that the grates will be dumped into hopper cars on narrow-gage track and the ash used for fill. Two 12-ft.-diameter by 200-ft.-high radial-brick chimneys have been erected. A 16-in. steam main will run from the boiler plant directly to the press room of the forge shop and an additional line will be run to the service building.

Progress of Construction

Actual work for the construction of the plant began in the latter part of September 1918, when ground was broken for temporary storage sheds. Barracks and mess halls were built to accommodate 1000 men and by January 1919 grading for the classification yard and excavation and foundation work for the open-hearth and machine-shop buildings was in full swing. The first steel work was erected in the open-hearth building on May 30, 1919. Excavation and concreting of the foundations for the forge and furnace buildings were undertaken in July and completed during the month of August, about 8000 cu. yd. of concrete being placed over the extended area in less than six weeks. Fig. 15 shows a typical main row column footing for this building.

During the past year the steel work has been completed on all the buildings except the gun-treatment building. All buildings have been enclosed with walls, sash and roof. Foundations have been completed for the 25 furnaces in the forge shop and for the 14,000-ton press. The 30-ton electric furnaces have been erected. The majority of the cranes have been put into operation. The boiler plant is nearing completion, also the service station. The gun pit and the river pump station are practically done.

The construction work remaining to be completed consists chiefly of the distribution systems for the plant services, the concreting of the roads and the installation of lockers, toilets and offices. Bottoms should be burned in the open-hearth furnaces and the first armor ingots cast by the time this paper is presented. The majority of forge furnaces are now completed and the 14,000-ton press should be erected and in operation by the first of the year.

Progress has been considerably delayed by the difficulty of securing and maintaining a sufficient force of qualified engineers and draftsman, and sufficient labor; the uncertainty of deliveries, due to transportation conditions; and the general unsettled conditions in the material market, although the latter situation was relieved by the obtaining of surplus material and used equipment from the Potomac Park Construction Work in Washington, from Navy construction work at Erie, Pa., and from the Army powder plant at Nitro, W. Va. A large quantity of equipment and material for the entire plant was also obtained from Army salvage.

Organization of Project and Personnel

The United States Naval Ordnance Plant is operated under the direction of the Bureau of Ordnance of the Navy Department. It was designed and built under the joint direction of that Bureau and the Bureau of Yards and Docks. The entire design and construction of the armor and gun-forging plant was done within the Navy and without recourse to a general contractor.

Admiral Ralph Earle was Chief of Bureau of Ordnance until recently relieved by Admiral McVey. The Armor Plant Division of the Bureau has been under the direction of Commander Logan Cresap.

The Chief of Bureau of Yards and Docks has been Admiral C. M. Parks. The Assistant Chief has been Captain R. E. Bakenhus who has also been Project Manager of the Ordnance Plant Division of the Bureau of Yards and Docks as well as Manager of Shipyard Plants for the Emergency Fleet Corporation.

The original Inspector of Ordnance in charge at the Naval Ordnance Plant was Commander J. B. Rhodes. He was relieved about a year ago by Captain George R. Marvel.

The specifications for and purchasing of the 14,000-ton press and its driving equipment and the detailed design of all furnaces and similar equipment were handled by the steel superintendent, Mr. W. J. Priestly, who is head of the Hot Metal Department.

(Continued on page 726)

Steam Formulas

A Critical Comparison of the Various Existing Formulations and the Development of a New Set of General Equations

By ROBERT C. H. HECK,[1] NEW BRUNSWICK, N. J.

THIS paper presents the results of an investigation which was at first intended to be no more than a critical comparison of existing formulations, but which soon grew into the task of developing a new set of general equations.

The discussion does not go beyond the four primary quantities temperature, pressure, volume and heat content. The two general or characteristic equations, for superheated steam of course, relate specific volume v and heat h, respectively, to temperature T (absolute) and pressure p (also absolute).

In brief summary, the theory of the subject is as follows:

For a perfect or ideal steam gas the volume equation would be

$$pv = BT \quad\ldots\ldots\ldots\ldots [1]$$

B standing for a constant which is determined by the molecular weight of the substance. According to this formula, product pv would not vary if T were constant, being independent of p as that is varied up or down the isothermal.

With an actual gas, especially near saturation, the product pv shrinks in isothermal compression, after a manner most generally expressed by the equation

$$pv = BT - X \quad\ldots\ldots\ldots\ldots [2]$$

The contractive term X is a function of both pressure and temperature, increasing with p but diminishing as t is higher and as the gas gets farther away from saturation.

From a study of experimental knowledge and as a result of trial against the data, the general term X is given a specific and detailed form which leads to the p-v-T equation

$$pv = BT - \frac{E}{T^m}\,p - \frac{F}{T^n}\,p^s \quad\ldots\ldots\ldots\ldots [3]$$

In this formulation the three exponents are fixed as $m = 3.5$, $n = 7.2$ and $s = 2$, while E and F are constant coefficients fixed by trial.

The general formula for heat content is similar to [2], being

$$h = h_0 - X' \quad\ldots\ldots\ldots\ldots [4]$$

for any temperature h has a maximum value at zero pressure and diminishes as pressure rises along the isotherm. An important theoretical relation whose derivation goes back to Clausius ties X' very definitely to X, giving the h-p-T equation the form

$$h = h_0 - \frac{E'}{T^m}\,p - \frac{F'}{T^n}\,p^s \quad\ldots\ldots\ldots\ldots [5]$$

The coefficients E' and F' bear to E and F fixed ratios which are rather simple functions of the exponents m, n and s. Zero-pressure heat content h_0 is an empirical function of T.

Three complete sets of equations have been proposed, namely, Callendar's, used by Mollier for steam tables in 1906 and by Callendar himself in 1915; Goodenough's, which underlie the table published in 1915; and the new equations by the writer. Those submitted to the Society by the writer in 1913 used less simple forms for terms X and X' and are not now given serious consideration.

A table in the paper gives all the constants for each of these formulations; and they enter into the comparisons with data, along with other formulations which are listed, notably the Marks and Davis tables.

The theory just described, while rational in its general form, is empirical in the definite valuation of its constants. Unfortunately we have neither method nor knowledge for its synthetic upbuilding from simple elements, so that the only practicable procedure is by trial solutions, testing overall effect against data. A very important determinant, especially for the necessary extrapolation far above the pressure limit of experiment, is furnished by Clapeyron's law. This relates latent heat to the increase of volume during vaporization, by a ratio in which the rate of change of pressure with temperature for saturated steam is the variable factor. The saturation pressure-temperature relation is the most accurately and completely known of the properties of steam, the writer accepting Goodenough's formula for this relation as satisfactory and final. The determinant is applied by evaluating assumed general equations for coincident saturation values of p and t and seeing how closely the resulting ratios agree with those from the independent p-t relation. The writer's final equations are the outcome of between sixty and a hundred trial solutions.

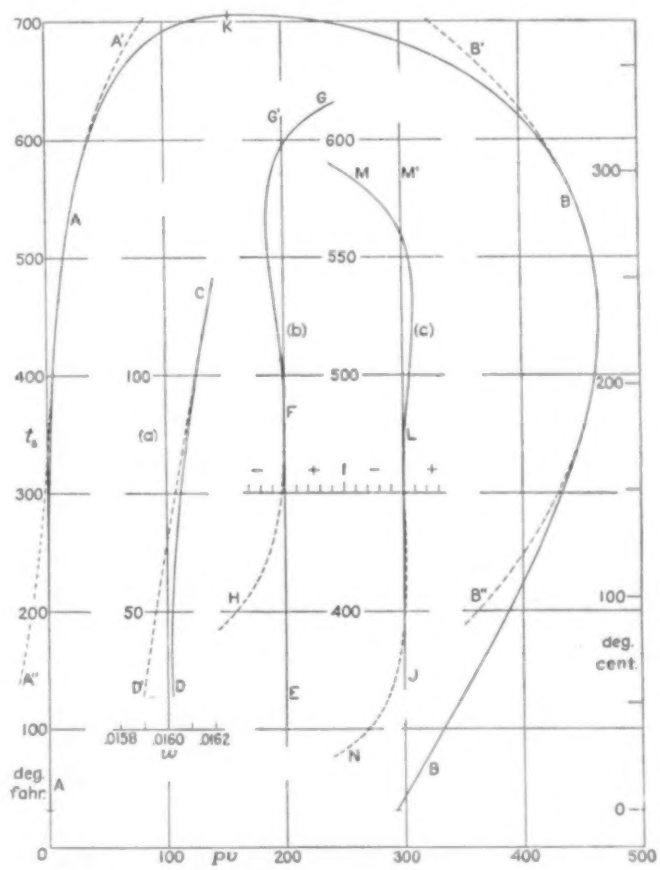


Fig. 1 Pressure-Volume Diagram for Saturated Steam

In presenting results and comparisons the paper follows the usual order of the steam tables, considering first saturated steam, then superheated. For the properties of hot water and of dry saturated steam the writer offers new empirical formulas: on the side of saturation these come down from the critical "point" and at about 500 lb. pressure merge with the saturation evaluations of the general equations. Fig. 1 shows a plot of curves for volume, showing product pv rather than the widely variant volume itself. The minor detail diagrams (a), (b) and (c) are concerned with a close study of the merging of formulas, and may be disregarded here. Note that the base (vertical) is saturation temperature t_s. In Fig. 2 the base is changed to pressure and comparisons are made with Marks and Davis (MD) and Goodenough (G) values. Remembering that all experimental data for steam are below 250 lb. pressure or 400 deg. fahr. saturation temperature, it is apparent that extension of the steam tables even to 1000 lb. pressure is very much of an extrapolation, and that theoretical relations which

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For presentation at the Annual Meeting, December 7 to 10, 1920, of The American Society of Mechanical Engineers. In this abstract of his paper the author has confined himself to a brief summary of the results of an extended investigation undertaken by him, in which existing steam formulas are compared and a new set of expressions are developed. The complete paper with its abundance of reference data and charts may be obtained gratis upon application by those interested. All papers are subject to revision.

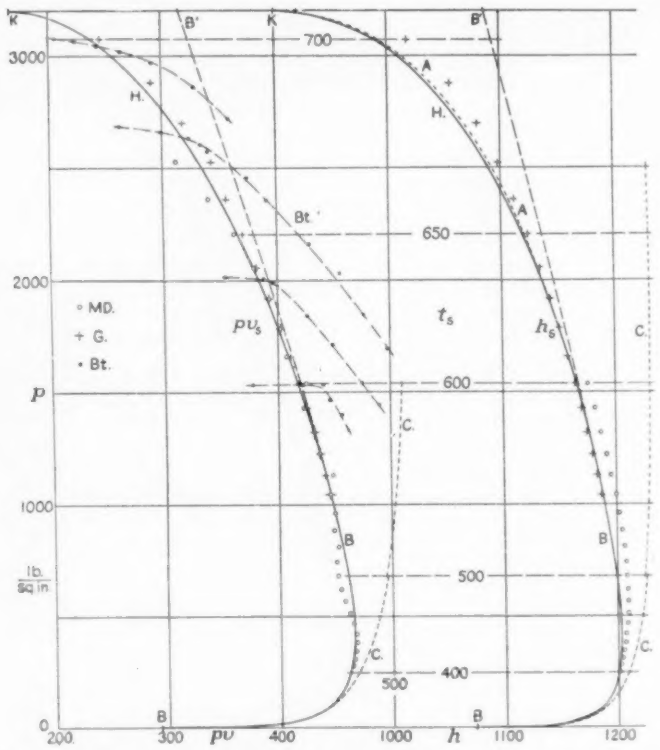

FIG. 2 DIAGRAM OF pv_s AND h_s ON PRESSURE BASE, WITH HIGH-RANGE COMPARISONS

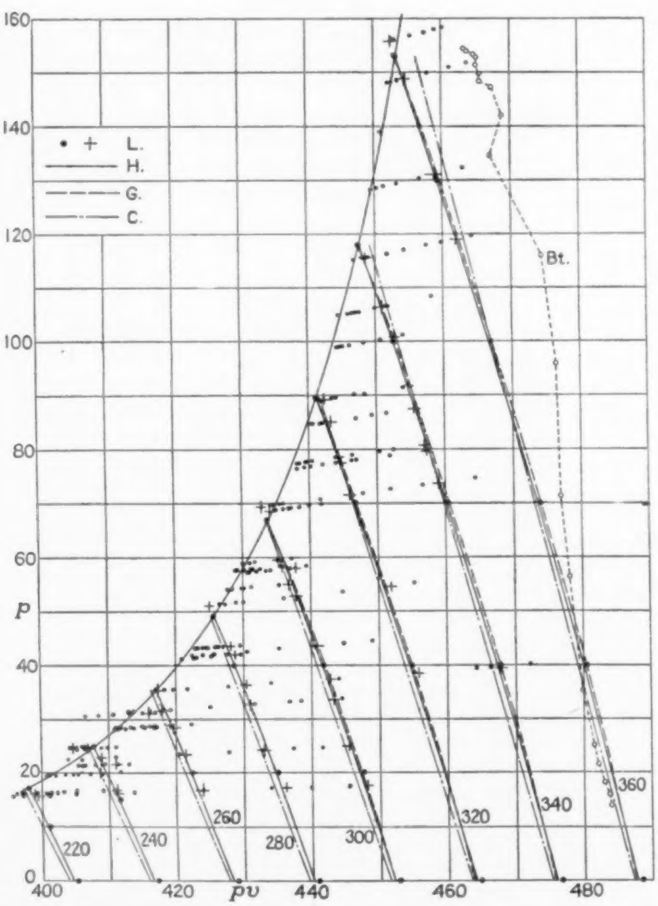

FIG. 3 COMPARISON OF CALLENDAR-MOLLIER, GOODENOUGH AND HECK ISOTHERMS WITH THE MUNICH VOLUME EXPERIMENTS

will guide in making this extension are highly important and useful.

The paper goes on to make close and magnified comparisons of the saturation lines with the low-range data, below 250 lb., to show the exact relative status of all the formulations, from Regnault's down. Turning now, however, to superheated steam, we have the three volume equations compared in Fig. 3 with the Linde data; note how the straight-line isotherms of Callendar (C) fail to conform with the experimental points for the same temperatures, marked +.

Comparisons with specific-heat data are made in Fig. 4, the experiments all having been made at Munich under the direction of Knoblauch and the last lot of them constituting the one body of new data since 1913. There is notably close agreement between the (G) and (H) curves.

A very practical and direct comparison of results on the side of heat content is made in Fig. 4, by plotting isotherms for 400, 500, 600 and 800 deg. fahr., up to 600 lb. pressure. Dotted curves, from the writer's Steam Engine and Turbine are contemporaneous with the Marks and Davis determinations; for high temperatures these are not even reasonably correct, being based on data that have been superseded.

The paper proceeds to discuss the form of the steam equations, describing the action and effect of the Clapeyron relation as a

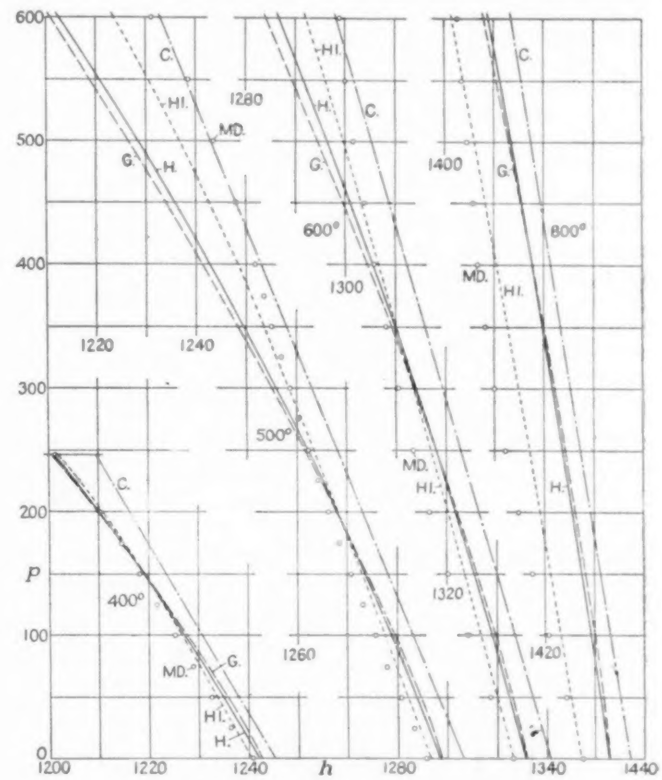

FIG. 4 COMPARISON OF HEAT-CONTENT ISOTHERMS

determinant and bringing in use of throttling relations and data as a test of final form. Noting how closely the writer's curves agree with those from Goodenough, the question is raised whether this shall be taken, practically, as an endorsement of the latter. Certain points in Goodenough's solution are rather sharply criticised, one on the ground of doubtful correctness in theory.

The whole discussion shows how close we are getting to final results in this department of scientific knowledge. The differences between the best solutions lie far within the range of experimental irregularity and uncertainty. The chief need is some accurate data for high-pressure steam, to confirm, or perhaps slightly to modify, the highly probable results now reached in this region. To isolate energy quantities for precise measurement under such pressure conditions would be almost impossible. On the side of volume the physical quantities are much simpler and easier to handle; and under the scheme of related formulas there is diminished need for data in both fields. A comparatively small amount of first-class physical experimentation would be sufficient to resolve any present uncertainty. Pending such information, and with the confident expectation that it can call for but little readjustment, the writer offers his new formulas as the best that can now be done toward establishing a standard steam table.

Foundations for Machinery

By N. W. Akimoff,[1] Philadelphia, Pa.

The purpose of building foundations is clearly defined and differs radically from that of providing substructures for machinery. Considerable contradiction can be found in blindly applying the principles of the former to the latter, and the results are sometimes so unsatisfactory as to necessitate the use of cushions and other yielding means, thus entirely undermining the very theory on which the foundation was supposedly built. Vibrations arise from either lack of balance or from other causes. The proposed theory contemplates the latter, the problem of balancing being considered as capable of complete solution by suitable treatment. After briefly considering the nature of possible displacements of the foundation as acted upon by various causes leading to vibrations, the author introduces, by way of illustration, a double pendulum, a few experiments with which form the basis of his theory. Means for localizing the expected vibration and of controlling the resulting periods are then illustrated in a working sketch of the proposed arrangement.

The weight of the Great Pyramid is approximately 5,274,000 tons, its base is 764 ft. square, and its height about 486 ft. It is built on leveled rock. The piers of Brooklyn Bridge are founded 44 ft. below the bed of the river upon a layer of sand, 2 ft. thick which rests upon bedrock. The massive St. Isaac's Cathedral, Petrograd, is built on a swamp, and the piling has been so carefully proportioned that the exceedingly heavy doors of the cathedral swing easily, whereas the slightest lack of uniformity in settling would doubtless lock them. These well-known structures are here mentioned by way of illustrating the obvious purpose of the foundations upon which they rest, i.e., (1) to distribute the load in as nearly uniform a manner as possible; and (2) to secure uniformity in settling.

Just how all this applies to foundations for all sorts of machinery, and in particular to rotative machinery, is not easy to say. Indeed, the weight, say, of a large pumping engine or of a turbo-generator outfit is generally much lower per square foot of floor space occupied than the limits prescribed by municipal laws or building ordinances, and furthermore, uniformity of settling of a relatively small volume of this nature can be secured without going to the extremes usually observed in designing footings for buildings. What, then, would be the general governing idea in proportioning a foundation, say, for an engine of a given type? Should it be heavy or light? Should it be deep, resting on rock or sand if possible? Should it be independent of the footings of the building, or would it be desirable to tie it to the latter?

By examining the existing records we can find a great variety of rather contradictory answers to each question, but the predominant idea in the mind of the designers appears to be somewhat as follows: Since the engine is likely to vibrate, let us tie it as firmly as we can to the earth itself. The mass of the earth being practically infinite, the amplitude of the resulting vibration will probably be zero. The designer may be utterly unconscious of this reasoning, but he applies it nevertheless and obtains results which sometimes are satisfactory and sometimes exceedingly poor.

Causes of Vibration

A rational basis on which to work is thus seen to be lacking and it is accordingly the object of this paper to point out some definite lines along which a rational theory of substructures for engines and moving machinery can in general be built up. To begin with, it is important to realize that vibrations are caused by two distinct orders of agencies: (1) Those due to unbalance, or, more correctly, lack of running balance; and (2) those due to causes other than unbalance.

As regards unbalance, it may be said that this can be so easily corrected in the construction of machinery that all specifications should invariably call for perfect running balance at all speeds, that is, complete absence of tremor or of "periods" under all conditions. However, there are many causes quite independent of balance, each of which is likely to result in vibrations, as for instance, "whipping" of a slender body (crankshaft, armature, turbine rotor, etc.); water in a steam turbine; peculiarities of the reciprocating mechanism—for instance, a 4-cylinder or an 8-cylinder V-type engine where certain forces do not cancel out and where running balance alone is not conducive to perfect results; or torsional vibrations, which under certain conditions produce an effect very similar to that of unbalance. Our problem, then, is to analyze the effect of these various causes, with the view of designing a substructure for a given machine that will be *least responsive* to these causes, for this is what the "relative" freedom from vibrations really means.

But whatever may be the cause of vibrations, it is safe to say that in general they are always due to *forces*, acting in a plane or planes, perpendicular to a certain axis; also to centrifugal *couples*, located in a plane, rotating about a certain line, usually the axis mentioned just above. We know from elementary mechanics that any motion of a body can be resolved into six distinctly separate motions: three *along* the three mutually perpendicular axes drawn

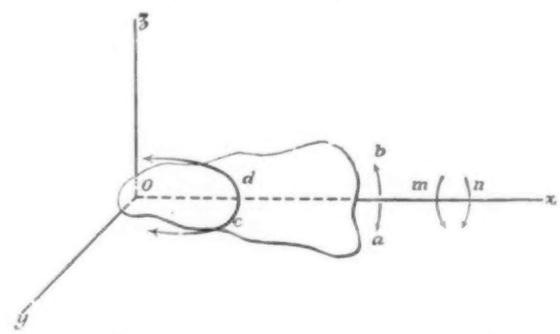

Fig. 1 Diagram of a Body with One Point Fixed

through any point, within or without the body, and three *about* these same axes. A free body, capable of a displacement in any of these six modes, is said to possess six degrees of freedom.

Vibration as Affected by Degrees of Freedom

If the body is rigidly locked so that no displacement of any kind is possible, we say that all six degrees of freedom have been suppressed. By fixing two points in the body we have the effect of rotation about an axis, and only one degree of freedom, that is, the angular displacement about the axis, characterized by these two points. By fixing one point we suppress all bodily motion along any three axes through this point, but we still have three degrees of freedom. Fig. 1 shows a body whose point O is fixed. Such a body can have only three kinds of displacement: (1) about the axis y, as shown by the arrows a or b; (2) about the axis z, as shown by arrows c or d; and (3) about the axis x, as shown by arrows m or n. It makes absolutely no difference what the forces are which act on the body, no other motion is conceivable.

On the other hand, placing a body upon a thick sheet of yielding material, or for that matter on four springs, means freedom in all six directions; and of course the same applies to cushions or pads. For this reason it appears to be of extremely questionable value to interpose layers of such material between a massive subfoundation and the foundation proper of a machine, even if isolated examples are on record where such an arrangement actually *happened* to give satisfactory results.

What is Stability?

With the foregoing in mind, let us digress for a moment. Stability with regard to our subject is a somewhat relative term. Why was the Great Pyramid built upon level rock? To insure stability. Why build a massive foundation for an engine? To secure stability. Why provide a layer of yielding material or springs or rubber pads? To secure stability. In other words, it is

[1] Mfr. Balancing Machinery, Mem.Am.Soc.M.E.

Abstract of a paper to be presented at the Annual Meeting, New York, December 7 to 10, 1920, of The American Society of Mechanical Engineers, 29 West 39th Street, New York. All papers are subject to revision.

Note: Patent protection controlled by the General Machinery Foundations Co., Philadelphia, Pa.

quite necessary to define in a more rational way the purpose of a foundation for an engine of a given type. We shall attempt to do this, first stating, however, the well-known effects of vibrations on various types of apparatus.

In large power plants where the main units are of the modern turbo-generating type the steam mains have been known to burst, and subsequent investigation has often revealed no defect in either material or in general arrangement of piping. The accident can thus only be explained as due to "rough" running, that is, vibrations.

The operation of a printing plant or of a leather-working factory is often extremely unpleasant for adjoining dwellings, and sometimes even for buildings located at a rather considerable distance. Inspection often reveals that machinery in such plants is firmly secured to extremely massive foundations and the owners are at loss as to how to remedy the trouble.

An internal-combustion engine often exhibits a certain amount of vibration which can be felt all over the understructure. In fact, owing to violent vibrations some of the tie rods, lamp brackets, etc., on automobiles have been known to snap in two, and in aircraft some of the instruments to drop off the board, yet these were parts of the understructure, to which they, as well as the engine

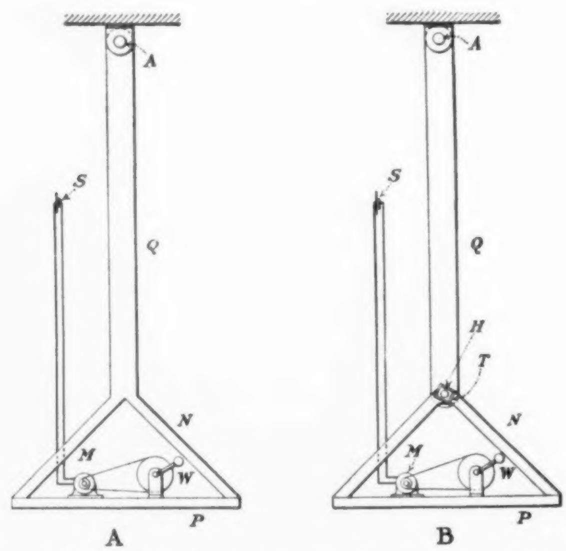

Fig. 2 A—System with One Degree of Freedom; B—System with Two Degrees of Freedom, One of Which May be Suppressed

itself, were firmly secured. The point we wish to emphasize is that in an understructure too much rigidity is as harmful as too much freedom to yield.

Stability Defined

We are now ready to formulate the new criterion of stability for foundations. Stability is here characterized by remoteness of the operative speed from any one of the several synchronous speeds at which the frequency of the operative speed would be nearly, or exactly, equal to the frequency of the free oscillation of the system, if displaced from natural state of rest and let go.

How many distinct synchronous speeds a system is capable of having depends upon the number of degrees of freedom. An absolutely free system, for instance, placed upon an elastic subfoundation, may have six independent synchronous speeds, or "critical" speeds, as they are sometimes called. A massive foundation resting upon rock is likewise often apt to be, in the larger sense, free in all six degrees, since it occasionally *does* vibrate and propagate the vibration to other buildings, etc. A system with one fixed point may have only three such synchronous speeds, while a system mounted to rotate about an axis can have only one such speed or "period," as it is often termed. If we could control these synchronous speeds, so as to make sure that none comes anywhere near the actual speed of operation of the machine, we would then have a fairly complete solution of our problem.

Vibration in a Body with One Degree of Freedom

In order to understand clearly the foregoing as well as the broad methods here proposed, let us consider the following experiment and the general consequences manifestly derived therefrom. Imagine a pendulum (Fig. 2-A) consisting of a platform P rigidly connected to the member Q by means of the side members N. The system is free to swing about the axis A in the plane of the figure. A small motor M fastened on the platform operates a countershaft carrying an off-center weight W. The motor is fed through a suitable flexible connection and it is always possible to adjust the speed of the countershaft so that the number of revolutions per minute will be equal to the number of double oscillations per minute of the pendular system. If the latter is slightly displaced from its vertical position of equilibrium and let go, the effect of this adjustment of speed will be the so-called "synchronism," and the extent of swing (amplitude) of the pendular system, in general very slight for arbitrary values of the rotative speed of the weight, will now become violent, in fact, out of all proportion to the magnitude of the weight itself.

This phenomenon of synchronism of cause and effect has been well studied. The amplitude at the exact condition of synchronism should theoretically be infinite, but of course in practice resistances of various kinds are always present, so that instead of *infinite* we have *large* amplitudes. The most curious fact is that in the vicinity of synchronous speed, both above and below, the amplitude drops down to a value almost insignificant, so that if the weight is small the system appears to be practically at rest. Furthermore, any further increase of speed will not produce any effect, contrary to the current opinion of those not very well versed in the matter. For the sake of illustration let this synchronous speed be 100 r.p.m.

Vibration in a Body with Two Degrees of Freedom

As a modification of the experiment let us now provide another system (Fig. 2-B) identical with the first except that the platform P is not solid with the member Q but is pinned thereto at H, the pin used being both frictionless and at the same time so arranged that it can be tightened up by means of the nut T, so as to lock the joint, thereby securing the exact effect of the rigid pendular system of Fig. 2-A. Providing the pin in the language of dynamics is the introduction of an additional degree of freedom, thus securing a system of two degrees of freedom; while the tightening of the nut amounts to suppressing one of the degrees of freedom, thus converting a two-degree into a one-degree system. In experimenting we shall first deal with the system of one degree of freedom, tightening the nut T and thus converting the pendulum into a system exactly similar to that discussed above, the synchronous speed being, say, 100 r.p.m. The pendulum will oscillate violently. We now loosen up the nut T, introducing an additional degree of freedom, with the apparently surprising result that the amplitude decreases practically to zero. If we reduce the speed considerably, say to 50 r.p.m., violent oscillations of the whole system will reappear, as will likewise be the case in speeding up the countershaft, say to 150 r.p.m. These figures are purely illustrative; whether they will actually correspond to exact facts will of course depend upon the characteristics of the system.

In other words, by introducing an additional degree of freedom we have accomplished this double result: (1) What was synchronous speed for a system with a single degree of freedom is no longer synchronous speed for the same system provided with an additional degree of freedom; (2) the new system has two frequencies of oscillation, at which it is sensitive to disturbing influences, one being below and the other above the value corresponding to that of the same system with the additional degree of freedom suppressed.

It should especially be observed that the oscillations were thus reduced practically to zero, not by steadying the system by something without it, but by some sort of an adjustment wholly within the vibrating system itself. Furthermore, what we did was to increase in a measure the flexibility of the system by breaking it in two; and although at first glance this might have increased the effects of the disturbing agency the actual effect was practically

(*Continued on page 699*)

Organization and Construction of Dye Houses

The Machinery Organization, Location, Construction, Ventilation and Piping of Dye Houses Considered from the Engineering Viewpoint

By A. W. Benoit,[1] Boston, Mass.

There are two distinct classes of dye houses, one being the converting plant which does dyeing and finishing for the trade; and the other, the plant dye house, which dyes and finishes for one mill only. The first generally covers a wider range and is prepared to do a great variety of work, while the latter is naturally of a narrower scope and is usually limited to dyeing the product of one plant. The converting plant is sometimes equipped to do bleaching and mercerizing, which add complications to their problems. For the purpose of this paper the dye-house problem will be discussed from the standpoint of the plant dye house.

The operation of dyeing enters largely into the four great branches of the textile industry, cotton, worsted, woolen and silk, and in many cases these lap over each other in the individual plants because of the great variety of combinations of stock used in making cloth. Cotton may be dyed in the raw stock, as yarn, or in the piece. Worsteds are dyed in the top, as yarn, or in the piece. The bulk of the woolen fabrics are dyed in the stock but yarn and piece dyeing is also common. Silk is generally dyed as yarn.

Machinery Organization

Following is a list of the kinds of machinery used in cotton, worsted and woolen dye houses. It will be noted that many of the machines appear in more than one of the lists. It must be borne in mind that most dye houses handle more than one kind of stock and in more than one form and will contain machines from more than one group.

Cotton-Dyeing Machinery:

- For Yarn:
  - Boiling-out machines
  - Doubling machines
  - Chain dyeing machines
  - Splitting machines
  - Beam dyeing machines.
- For Piece Goods:
  - Jigs
  - Continuous dyeing machines
  - Padders.
- For Raw Stock:
  - Pressure kettles
  - Rotary raw-stock kettles
  - Hand tubs.
- Miscellaneous Machinery:
  - Dye cans
  - Mangles
  - Washers.

Worsted Dyeing Machinery:

- For Yarn:
  - Rotary skein-dyeing kettles
  - Spool-dyeing kettles.
- For Piece Goods:
  - Piece dye kettles.
- For Slub Dyeing:
  - Top-dyeing machines.

Other Machinery:

- Crabs
- Steamers
- Flat and string washers
- Extractors
- Carbonizing machines
- Dry cans
- Tentering dryers.

Woolen-Dyeing Machinery:

- For Yarn:
  - Rotary skein-dyeing kettles
  - Spool-dyeing kettles
  - Skein dyeing in machines in which liquor is circulated.
- For Piece Goods:
  - Piece dye kettles.
- For Raw Stock:
  - Rotary raw-stock kettles
  - Stock dyeing in machines in which dye liquor is circulated
  - Hand tubs.

Silk-Dyeing Machinery:

- For Yarn:
  - Rotary kettle for skeins
  - Hand tubs.

Location of Dye House

The location of the dye house in the plant is influenced by (1) sequence of operations, (2) water supply, (3) steam supply and (4) drainage. It is impossible to lay down any fixed rule as to the location of the dye house in a plant in its relation to other operations, because most dye houses handle the stock at more than one stage of the process. Each dye house becomes a problem in itself and its location must be decided upon by the particular conditions surrounding it and the purpose for which it is to be used. If a dye house handles its product all in one form such as raw stock, yarn or cloth, its location is easily fixed, and if it handles stock in more than one form there is generally a preponderance of one kind which determines its location. In general, the position of a dye house for various kinds of plants would be as given below, from which it will be seen that the choice of location depends upon the form of the bulk of the product.

Cotton	Dyed yarn	Near warping, dressing and slashing department
Cotton	Piece goods	Near gray room and finishing department
Worsted	Yarn	Near warp-preparing department
Worsted	Piece goods	Near gray room and finishing department
Woolen	Raw stock	Near scouring and picking department
Woolen	Yarn (unusual)	Near dressing room

A dye house requires an abundant supply of clean, soft water. If this is available from a canal or river the dye house can often be advantageously located to secure its supply by gravity and thus

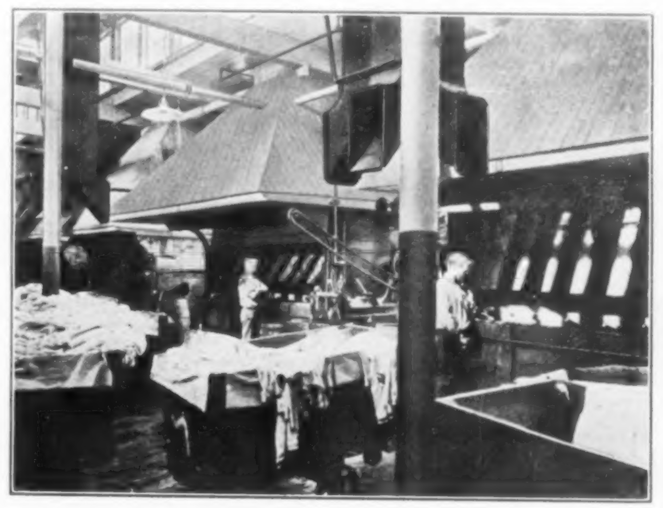

Fig. 1 Dye House with Ventilation

avoid pumping. If the water is taken from a pond, it usually has to be pumped and therefore the location of the supply has no influence on the location of the dye house. When the water is so hard as to require a softening plant, pumping is required and the same thing holds true with regard to location.

Size of Building. In determining the general dimensions of the building a machinery organization plan must be made of the equipment to be installed. The width of the bay is not essential and is usually about 10 ft. The length of the span from column to column and column to wall should be about 25 ft., providing space for one row of kettles and an ample working alley (Fig. 1).

The kettles should be installed in pairs, right and left hand, with the drives whether belt- or motor-driven, outside, and an alley of 4 or 5 ft. between ends of each pair of kettles. If there are but few kettles they can be economically arranged in two rows in the center of the room, the fronts facing the outer walls with a 12- to 16-ft. working alley. The backs should be set 6 ft. apart. If there are a large number of kettles they are best arranged in four rows. The two outer rows facing the walls with a 12- to 16-ft. working alley, the two inner rows facing the center of the room with a 16- to 20-ft. working alley.

The height of the room should be from 16 to 18 ft. at the eaves. If the building is three spans or more in width there should be a monitor in the middle to light the inner rows of kettles as the window light is largely cut off by the machines and ventilators.

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[1] Assistant Engineer, Charles T. Main.

Abstract of a paper to be presented at the Annual Meeting, New York, December 7 to 10, 1920, of The American Society of Mechanical Engineers, 29 West 39th Street, New York. All papers are subject to revision.

Type of Building. A one-story building is the best type for ventilation and light and is the most satisfactory unless crowded for room. Slow-burning mill construction consisting of brick walls, wood roof and concrete foundation and trenches, is desirable. The use of exposed steel is to be avoided in every way and for this reason wood sash are preferred to steel, because of the corrosion due to moisture and acid fumes. An ordinary flat roof with a monitor, using hard-pine beams and 4-in. spruce plank, works out satisfactorily. The extra thickness of roof plank is necessary in cold climates for insulating purposes. Spruce or Douglas fir is preferable to hard pine as the latter contains resin which is softened by the heat and is likely to drop on goods waiting to be dyed.

All timber and plank used in the roof and monitor should be kyanized after the framing has been done and before putting into place. This necessitates that much of it be done on the job. It is the best safeguard to employ against decay and well worth the expense.

Dyer's Office. An office should be provided for the dyer, located on the north side of the room if possible, having a large window, preferably of plate glass at which he can match samples of work taken from kettles, for shade and color.

Drug Room. Space should be provided for the storage of dye stuffs and chemicals used in the dye house. This room should be

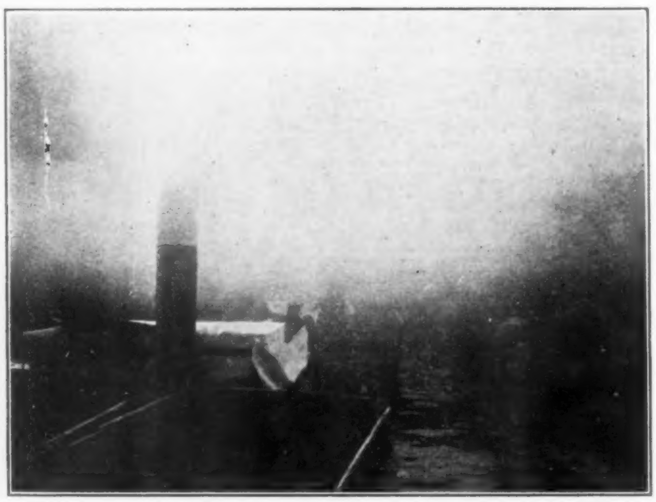

Fig. 2 Dye House without Ventilation

near the dyer's office and partitioned off from the kettle room. It should be well lighted and have a steam and water supply to convert dry colors into liquid form before they are placed in the kettles.

Laboratory. The modern and well-equipped dye house of today is provided with a laboratory where the dye stuffs and chemicals purchased, may be tested and small samples of stock dyed. This should be located next to the dyer's office and connected to it.

Trenches. Practically all types of dye kettles and washers are set so that much of the machine is below the floor level. These should be concrete trenches about 11 ft. wide by 6 ft. deep in which supports are provided for the machines, leaving a clear space underneath for the flow of the waste, and ample room all around to get at all parts requiring attention. In large dye houses and also in those where, because of local ordinances, it is necessary to separate the hot waste dye liquor from the rinse water, an auxiliary drain should be provided in this trench. This is done by installing a separate drain pipe on one side or partitioning off part of the trench. A main intercepting drain crosses the dye house, into which all the trenches are connected, and in some cases two such drains are provided to keep the wastes separate.

Floors. In a dye house of the above description the trenches are planked over after machines are placed and all spaces between the trenches are backfilled and the floor is laid directly on the ground. The floor consists of a concrete base with either a granolithic or paving-brick top, pitched to drain into the trenches. A granolithic top is only good in small dye houses where the trucking is light, because such floors crack more or less and break down at the edges under traffic, causing depressions which hold water and make trucking difficult. A granolithic floor that will stand up under heavy trucking can be laid by placing cast-iron grids on the concrete base and putting the granolithic finish over the grids and floating flush with the top. This floor is expensive but will stand a great deal of abuse. The best floor is obtained by using a vitrified paving brick bedded in cement mortar and well grouted. These bricks should be not less than 2 in. thick and thoroughly vitrified. A common hard-burned brick will not answer the purpose.

The chief cause of obscurity in a dye house when kettles are boiling is not due to steam in suspension but to the dense fog caused by the precipitation of the moisture in the saturated air when it comes in contact with cold ceilings, floors, walls, pipes and cold air seeping into the room. Some of the hot vapor rising from the boiling kettles and tubs will condense on coming in contact with the overhead structure and the water will drip to the floor. That which is not expelled by fans or ventilators will cool off to the room temperature, creating a fog which settles toward the floor, gradually filling the whole room.

The simplest form of ventilation is to depend on the natural ventilation from the windows and monitor. In very small dye houses this gives fair results in summer, but in the cold weather it is inadequate. It can be helped by a large heating system designed to keep the temperature of the air above the point where fog will form, or by putting the dryers in the dye house, but at the best it is unsatisfactory.

It is very often attempted to clear the air by using exhaust fans in the monitor, and while this scheme will remove the hot, oppressive vapors, it does not clear the fog which lies in the lower half of the room. The air necessary to replace that driven out by the fans, comes in at the doors, windows or other inlets, and as soon as the cold air comes in contact with the warmer saturated air a fog is produced which cannot be removed by fans.

Another scheme is to put large wooden hoods over the machines, singly or in pairs, with a vent from each hood going up through the roof and well above it. The idea is to catch the hot vapors before they are dispersed and by means of the natural draft due to the difference in temperature, to get them out of the room. This works out fairly well and will give good results under normal conditions in medium-sized dye houses. There is still some fogging due to the cold air in winter being drawn into the room to replace that carried out with the steam but the humidity is much lower than with open kettles so that this is not so serious.

Some large dye houses have been ventilated without the use of hoods over the machines by means of warm air blown in along the ceiling and delivered in large quantities about 7 ft. from the floor toward the machines. The steam, fog and surplus air escape through the monitor windows or ventilators in the roof. By this method the ceiling is kept dry and the fog is eliminated to a distance of about 6 ft. from the floor. The shafting, piping and equipment in the upper part of the room is obscured by the fog which is moving upward. (Fig. 2).

The system of ventilation which has given the best results is to place over the kettles hoods having vents up through the roof and to distribute warm, dry air over the room and in a blanket on the under side of the ceiling in sufficient quantities to produce a slight pressure. This prevents any cold air from coming into the room and causes the steam to discharge directly up through the vents keeping the ceiling free from appreciable condensation and the room free from visible vapor. The temperature of the air to perform this work should not be over 80 deg. fahr.

The air is furnished by a steel-plate fan taking its air through a sectional heater in which any desired number of sections can be heated depending on the temperature, and distributed about the room by a system of air ducts suspended close to the roof, having outlets delivering a blanket of warm air along the ceiling, eliminating all condensation from that source and having branch ducts dropping down to within 7 ft. of the floor with outlets discharging toward the hoods and about the room. During the summer months the windows should be kept closed and the apparatus kept in operation but without steam on the heater. With the room clear of all condensation, vapor or steam, individual or group motor drive for the dye-house machinery may be used with safety.

(*Continued on page 706*)

Rational Design of Hoisting Drums

By EVERETT O. WATERS,[1] NEW HAVEN, CONN.

The main problem of hoisting-drum design resolves itself into two parts: determination of flange shape and thickness, and determination of the thickness of the drum body. Other factors, such as brake, clutch, and bearings, have already been investigated and are therefore not considered in this paper.

Flange thickness is a function of (a) rope tension and (b) depth of winding. Previous theoretical investigations have recognized these factors but have failed to take account of the friction between adjacent coils of rope and between rope and drum, which tends to hold the coils in position without the aid of the flanges, and have also disregarded the flattening of the inside coils under pressure from the outer layers.

A theoretical formula is deduced for the total pressure against a drum flange caused by the winding-on of rope to a given depth and under a given initial tension. Two other formulae are then deduced, which relate this total pressure to the flange thickness and the maximum allowable tensile and shearing stresses in the material. By means of these formulae a flange of the usual straight-sided or the mushroom type may be designed to withstand safely the pressure of the rope wound upon the drum.

The drum body is subjected to combined stresses, since it is under compression from the coils wound upon it, under tension due to the lateral pressure against the flanges, and under combined torsion and bending caused by the load which is to be hoisted. Formulae are derived which may be used to obtain the correct thickness both at the center of the drum, where the normal stresses are greatest, and at the ends of the drum, where the shearing stresses are most prominent.

Tests were made with small-size rope wound upon a special drum, which was so arranged that the side thrust against one flange could be directly measured while the rope was being wound on or unwound. These tests show conclusively that formulae for flange pressure which do not take account of rope friction and flattening give excessively large results.

SOMEWHAT over a year ago the writer's attention was called to certain details in the design of rope-winding drums as commonly used in hoisting and conveying machinery. Upon investigation it appeared that little if any study of this subject had been made beyond the private researches of various firms engaged in manufacturing hoisting apparatus. Published matter dealing with this class of machinery makes scanty reference to the design of hoisting drums, and recommends proportions based on careful guesswork or previously accepted practice rather than upon theory or experiment.

Such being the case, it seemed well worth while to make a special study of the hoisting drum, with a view to deducing some logical rules for proportioning the important parts. There are in reality only two such parts that require this analysis: the drum body or core, and the flanges. Other details, such as length of bearing, size of arms connecting the drum core with the hub at either end, and proportions of brake and clutch surfaces, present no novel problems; a discussion of these parts is accordingly omitted from this paper.

Design of Drum Flanges

In many installations of hoisting machinery the length of rope to be handled is not great and it is quite possible to wind it in a single layer on a drum of moderate diameter and length. This is, of course, the most desirable arrangement, since it insures uniform hoisting speed, obviates the danger of overwinding at either end of the drum if the rope is improperly guided, and prevents the wear on the individual wires which results when two or more coils are wound on the drum in contact with each other. However, it is often necessary to wind great lengths of rope on comparatively small drums, and in such cases the end flanges must be relied upon to support the rope at the ends of the layers of which there may be as many as 14, 16 or more. In addition these flanges are usually subjected to a stress from brake, friction clutch, or both. It is therefore necessary to know (a) the maximum tangential load on the flanges caused by the brake, (b) the maximum axial or tangential load due to the clutch, and (c) the load due to the axial thrust of the several layers of rope.

Theoretical Determination of Axial Thrust

First Method. The first two of these loads can be found quite readily, as explained in treatises on brakes and clutches. The third is much more difficult to determine, and it has been suspected for some time that the theoretically obtained values for this thrust or pressure do not agree with the facts. The series of tests described in a later paragraph were made for the express purpose of throwing light on this point.

In deriving a simple formula for the axial thrust, it is assumed that the coils of rope are wound uniformly, the coils of each successive layer resting in the spaces between coils of the preceding layer, as shown in Fig. 1. Friction between contiguous coils and between rope and drum surface is neglected. If the drum is grooved, as shown in the figure, all coils in the central part of the drum (those numbered 100 and higher in the figure) will be self supporting, while a certain number of coils, occupying a space o

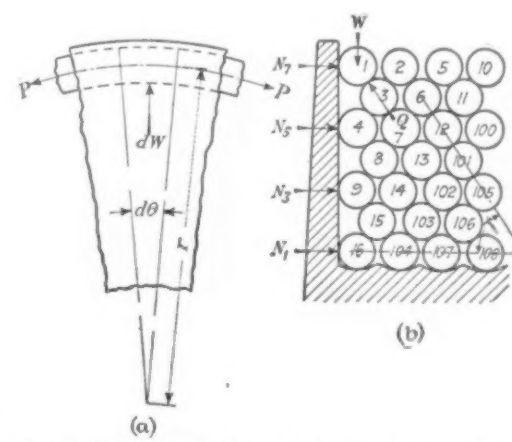

Fig. 1 Diagram of Coils Wound on Grooved Drum

wedge-shaped cross-section at each end of the drum, must rely upon the flanges for their support. Thus in Fig. 1 the coils numbered 1 to 16, inclusive, are the only ones which will cause axial thrust against the left flange. This thrust, which is indicated by the forces N_1, N_3, N_5, etc., in Fig. 1, is computed as follows:

When there are $2m - 1$ layers of rope,

$$N_{2m-b} = bW \cot\gamma = 2\pi bP \cot\gamma \ldots\ldots\ldots\ldots [1a]$$

$$N_1 = (m-1)W \cot\gamma = 2(m-1)\pi P \cot\gamma \ldots\ldots [1b]$$

When there are $2m$ layers of rope,

$$N_{2m-b} = (b+1)W \cot\pi = 2(b+1)\pi P \cot\gamma \ldots\ldots [1c]$$

$$N_1 = (m - {}^1/_2)W \cot\gamma = (2m-1)\pi P \cot\gamma \ldots\ldots [1d]$$

The total axial thrust for an odd or even number m of layers is approximately

$$N_1 + N_3 + N_5 + \ldots + N_m = N = \frac{m^2 - 1.5}{2} \pi P \cot\gamma \ldots [2]$$

Second Method. The foregoing expressions are easy to use, but in the writer's opinion give results which are excessive, this being corroborated by the experiments described toward the end of the paper. Three important factors have been disregarded: friction; cross-over of the rope from a given space between coils on the preceding layer to the second space beyond, due to the fact that alternate layers are wound right and left hand; and compression of the internal layers. All three of these tend to lessen the axial thrust. An approximate expression for this thrust, as modi-

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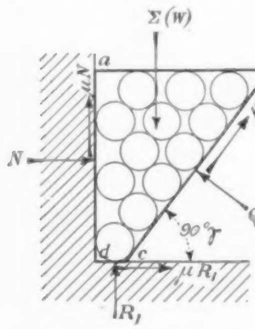
fied by these conditions, may be found by considering the end coils as a solid wedge *abcd*, Fig. 2, upon which forces are acting as indicated. The effective slope of this wedge is not the actual slope γ of the center lines of the coils, but is $90° - \gamma$, because that is the actual inclination of the contact surfaces between contiguous coils. The coefficient of friction γ is probably higher for rope on rope than for rope on drum. For example, some experiments performed by the writer gave 0.201 for the friction of rope on rope and 0.181 for rope on drum, these results having been obtained by wrapping a short length of $^1/_4$-in. rope around a drum, hanging a known weight from one end of the rope, and then suspending enough weight from the other end to just cause slipping. The rope was bright, but not lubricated, except with the grease applied in manufacture; the drum was finish-turned and unlubricated. In view of the closeness of these results, a single value for μ has been assumed in the following analysis.

The radial force R_1 is indeterminate; it is therefore assumed equal to $1/p$ times the vertical component of all forces acting along *dc* and *cb*, where p is the number of coils between a and b. For example, if there are six layers as in Fig. 2,

$$R_1 = \frac{1}{3^1/_2}\,[R_1 + Q\,(\sin\gamma + \mu\cos\gamma)]$$

$\Sigma(W)$ is the sum of the radial components of the tensions on all



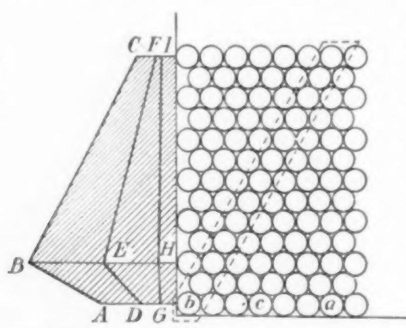


FIG. 2 (LEFT) DIAGRAM SHOWING FORCES ACTING IN ROPE WOUND ON DRUM

FIG. 3 (RIGHT) DIAGRAM SHOWING DISTRIBUTION OF AXIAL THRUST OVER SURFACE OF FLANGE

the coils in the wedge; in other words, $\Sigma(W) = 2\pi\Sigma(P - P')$, where P is the initial tension in each coil and P' the tension loss in the same coil due to the pressure from outer layers.

Taking the sum of the horizontal and vertical components of all the forces shown in Fig. 2 and eliminating R_1 and Q, the following equation for the end thrust against each flange is obtained:

$$N = \frac{(p - \mu^2 - 1)\cos\gamma - \mu p \sin\gamma}{(1 - \mu^2)\,p\sin\gamma + \mu(2p - \mu^2 - 1)\cos\gamma}\,2\pi\Sigma(P - P') \quad [3]$$

This equation is to be considered as a refinement of Formula [2], in which no account was taken of μ or P'. It is interesting to note what widely divergent results the two formulæ give, especially when the number of layers is large.

The tension loss P', which to the best of the writer's knowledge has hitherto been disregarded or avoided in all published works dealing with the design of hoisting drums, deserves some discussion at this point. As each successive layer is wound on the drum, the preceding layers are flattened out to a certain extent; this reduces the actual length of each flattened coil and thus relieves it of a part of the initial tension P which was applied by the hoisted load at the moment when the coil was wound upon the drum. Suppose, for example, that a $^1/_4$-in. rope is being wound upon a 10-in. drum under a tension of 1000 lb. First, the bottom layer is completed, each coil having the initial tension of 1000 lb. Then the second layer is wound on, each coil of which has a tension of 1000 lb. But at the same time, the tension in each coil of the first layer drops to 700 lb. When three layers have been completed the outside layer is under the initial tension, while the tension in the second layer has fallen to 500 lb. and that in the first layer has dropped from 700 to 600 lb. With four layers the effect is still more pronounced, the respective tensions being 1000, 400, 250 and 500 lb. In general, the maximum compression occurs near the middle layer; the inner layers are prevented from much shortening by the unyielding surface of the drum, while the outer layers, being near the surface, are acted upon by comparatively small radial forces.

It is possible to determine the reduction in tension in each layer, and hence the value of $\Sigma(P - P')$, by a simple analysis of the mechanical principles involved. Unfortunately, however, as the number of layers of rope increases the number of unknown quantities increases correspondingly, and the equations which accumulate can only be solved after much laborious computation. But by making the assumption that the radii of all the layers are approximately equal, the formulæ are greatly simplified. Table 1, based on this assumption, gives values of P' for each layer, in terms of the initial tension P, for windings of a number of layers.

The quantities E' and m, involved in the expression for h in Table 1, deserve a word of explanation, since they represent properties of the rope which determine the extent to which it will yield under lateral pressure. E' may be termed the "lateral modulus of elasticity," and defined as the ratio of lateral pressure per unit length of rope to the decrease in rope diameter measured along the line of action of the pressure. On account of the non-homogeneous character of wire rope, E' bears no direct relation to the true modulus of elasticity E and is best determined by test. The writer obtained the value $E' = 9260$ lb. per sq. in. for new $^1/_4$-in. 6 by 19 hoisting rope with hemp center. Obviously rope with steel center would give higher values of E', while cotton-centered or 8-strand rope would probably give lower values, on account of the greater softness of the core. The coefficient m is a factor of lateral deformation, or ratio of the increase in rope diameter along one axis to the decrease along a perpendicular axis, the lateral pressure causing this deformation being assumed to act along the latter axis. Its value is probably less than 0.3, the value for homogeneous steel, since the pressure which causes deformation is applied at isolated points instead of over the entire surface.

An example was worked out using both formulæ. With the same values in both cases the aggregate tension on all the coils in the wedge, taking the flattening of the coils into account, was found to be 34,460 lb. as compared to an aggregate tension of 63,000 lb. neglecting this flattening effect.

Formula [3] tells nothing about the distribution of the axial thrust over the surface of the flanges. According to the first method for determining it, where friction and coil flattening are disregarded, the distribution over a small sector is as indicated by the line *ABC*, Fig. 3. The effect of friction is probably to reduce the abscissæ of the shaded area a constant amount, to such a line as *DEF*. But the aggregate effect of coil flattening is much more pronounced near the drum body, so that when both friction and coil flattening are considered, the pressure is in all likelihood distributed with a fair degree of uniformity over the sector of flange. This is indicated by the line *GHI*. The experiments described later point toward the same conclusion; and in the absence of more definite information, a uniform distribution of load over a given sector will be assumed in determining the strength of the drum flange.[1]

EFFECT OF UNGROOVED DRUMS ON AXIAL ROPE PRESSURE

Thus far it has been assumed that the surface of the drum body is grooved. This is undoubtedly the best practice, since it insures the proper spacing of coils, tends to make the winding of all the layers uniform, and reduces wear. In addition it makes the coils of rope in the middle of the drum self-supporting, without the aid of the drum flanges.

With the ungrooved drum, the tendency of the bottom coils to side-slip is counteracted partly by friction, and partly by the fact that a number of coils in the middle part of the drum are "balanced," that is, the pressure from the outer layers which tends to slide one of these coils to the left, is counteracted by an equal and opposite pressure tending to slide the coil to the right. In Fig. 3 the coil a is thus balanced; but all the bottom coils to the left of a

[1] By "uniform distribution over a sector" is meant a distribution in which (load per unit area) multiplied by (distance from area to drum axis) is constant. This should not be confused with the common meaning of uniform distribution, as used in connection with beams, floors, etc.

receive an excess of pressure from the right, which tends to slide them to the left. This means (remembering that all coils in a layer are in contact with each other) that an additional load in the nature of a shearing force is placed upon the drum flange.

Coil b, Fig. 3, presses against the flange with a force $(m - 1) \times \pi P \cot \gamma$, neglecting friction, compression of coils, and the pressure of the coil immediately to the right. This force is caused by the coils included in the oblique strip indicated by dotted lines. Denoting by $\Sigma(P')$ the total tension loss in these coils due to compression, and taking account of the friction between coil b and the drum body and flange, the net pressure of this coil against the flange is

$$N_1 = \pi[(m-1)P - \Sigma(P')] \frac{\cot \gamma - \mu}{1 - \mu^2}$$

The coils between b and a will cause a pressure against the flange, of similar form but smaller magnitude, the decrease being due to the partial balance of these coils. Therefore it may be assumed that the total shearing force on a drum flange caused by non-grooving of the body is

$$\Sigma(N_1) = \frac{\pi n}{2} [(m-1)P - \Sigma(P')] \frac{\cot \gamma - \mu}{1 - \mu^2} \quad \ldots\ldots [4]$$

n being the number of unbalanced coils in the first layer.

The problem of deducing a relation between load and stress in the flange is no easy one to solve, owing to the diverse forms of flanges which are embodied in standard designs, and the use of

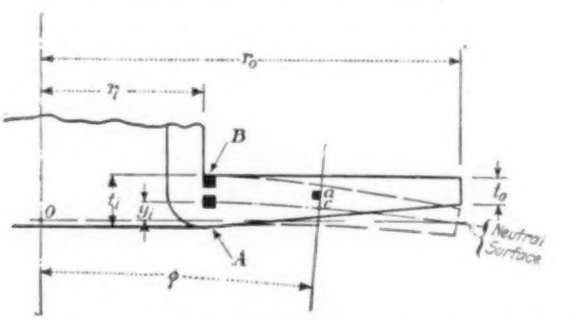


FIG. 4 DIAGRAM FOR STUDY OF STRESSES IN FLANGE OF HOISTING DRUM

stiffening ribs, wide rims, etc. After considerable study the writer selected the mushroom type illustrated in Fig. 4 as being the simplest and at the same time the most widely used. The load-stress-flange-thickness formulæ were then derived by first obtaining a relation between the radial and tangential strains at any point in the flange and the coördinates of that point. This gives a relation between the true radial, tangential, and shearing stresses at the point and the coördinates of the point. By a single integration the total shearing stress on a cylindrical section of the flange containing the point was found; this was set equal to the external load acting on that part of the flange between the cylindrical section and the rim; and after successive integrations the deflection of the point was obtained. By proper substitution the true radial, tangential and shearing stresses at the point could then be found in terms of known quantities, i.e., the flange thickness, inside and outside radii, and external load. By giving this general point certain specific locations, a number of formulæ were deduced.

In determining the constants of integration the following boundary conditions were assumed: The shear at the surface of the flange is zero; the radial stress at the rim of the flange is zero; the slope of the deflected flange is zero at the shoulder (rigid connection between flange and drum body); and the deflection of the flange at the rim is a maximum. In order to simplify the integrations, the following relation was assumed between the thickness of the flange and its radius:

$$t_r = \frac{1}{\sqrt[3]{\alpha + \beta r}}$$

where t_r = thickness of flange at radius r, and α and β are constants. This gives a shape of flange closely approximating that in Fig. 4. A special case arises when $\beta = 0$; the flange is then of constant thickness.

Formulæ were derived for the radial stress (tension and compression) at shoulder of flange, p_r; tangential stress (tension and compression) at rim of flange, p_t; and for shearing stress at the shoulder of the flange, s. These equations give the stresses caused by the lateral rope pressure. By a similar analysis it is found that the action of the clutch causes similar stresses at the clutch flange, namely, p'_r, p'_t and s'.

These latter stresses act counter to the stresses p_r, p_t and s. In other words, when the first layer of rope is being wound on the drum, the clutch flange is stressed in tension in the region A, Fig. 4; but as the number of layers increases, this stress becomes less and less until a point is reached at which p_r and p'_r exactly neutralize each other, after which p_r becomes the greater and the flange is under tension in the region B. As a rule the net stress due to loads N and C combined will not exceed p_r, p_t and s, unless the depth of winding is kept down to two or three layers.

To determine the effect of the turning force S, consider (1) a small cube in the region B, Fig. 4, and (2) a small cube halfway between A and B, on the neutral surface. The first cube is subjected to an apparent radial stress $p_1 = (p_r - p'_r)q^2/(q^2 - 1)$, an apparent tangential stress $p_2 = p_1/q$ and a shear $S/(2\pi r_i t_i)$. Combining these in the usual manner to find the principal stresses, and combining the principal stresses to find the true stresses, we have:

$$p' = \frac{1}{2}\left[(p_r - p'_r)^2 + \sqrt{(p_r - p'_r)^2 + \frac{S^2(q+1)^2}{\pi^2 r_i^2 t_i^2 q^2}}\right] \quad \ldots\ldots [5]$$

$$S' = \frac{1}{2}\sqrt{(p_r - p'_r)^2 \frac{q^2}{(q+1)^2} + \frac{S^2}{\pi^2 r_i^2 t_i^2}} \quad \ldots\ldots [6]$$

q being the factor of the lateral contraction. The second cube is subjected to no normal stresses, but to two shearing stresses at right angles to each other, $S/(2\pi r_i t_i)$ and $0.23qNt_i^2/(r_o t_o^3)$. Hence the total stress is the algebraic sum of these two.

The writer must admit that these formulæ have a formidable appearance and will be likely to discourage the designer who is looking for simple and easily applied rules. The chief difficulty lies with equations for p_r, p_t, p'_r and p'_t; when these have been solved it is a comparatively simple matter to apply Formulæ [5] and [6] as checks to determine whether the addition of a force S will still keep the stresses within safe limits. On the other hand, the equations for p_r and p_t may themselves be much simplified by omitting terms of negligible value and by assuming that the flange is of constant thickness. When the winding space is shallow as compared with the diameter of the drum, the flanges approximate short cantilever beams of depth t_i, width $2\pi r_i$ and carrying a uniformly distributed load N and a concentrated load $-C$. The tangential stress vanishes, the maximum radial stress becomes

$$p_r = 0.477(1 - k)\frac{N - 2C}{t_i^2} \quad \ldots\ldots [7]$$

and the maximum shear (due to loads N and C) becomes

$$S = \frac{0.23q(N - C)}{r_i t_i} \quad \ldots\ldots [8]$$

The additional stress caused by load S may be found as in Formulæ [5] and [6].

DETERMINATION OF STRESSES IN THE DRUM BODY

The obvious load in this case is one of compression, due to the crushing effect of the rope wound upon the drum under tension. There are, however, additional applied forces which should be considered in a careful analysis of the problem. Besides acting as a cylinder under external pressure, the drum body is also a beam supported at the ends and carrying a moving load, a shaft transmitting a torsional moment and a tensional member serving to tie the flanges together. These forces combine to produce definite stresses which vary in different parts of the drum, so that it is necessary to select certain points at which the stresses are to be determined and to assume certain positions for the moving load P. The most suitable points are shown in Fig. 5 by two unit cubes, set "square" with the drum, it being assumed that the rope pull is acting vertically upward. One of these cubes is in the center of the drum body, on the side which is under tension, considering the drum as a beam; the other is alongside one of the points of support of the drum body and in the neutral plane.

Consider the first cube. On each face there is a normal force and in the x-y plane there is a shear due to the torque transmitted. X is a tension caused by the rope pressure on the flanges, minus the clutch presure, to which is added the tension caused by the bending effect of the load which is assumed to hang from the middle of the drum. Dividing by the section area for the direct tension, and using the common flexure formula for the bending, we have, approximately,

$$X = \frac{N - C}{2\pi r_i t_d} + \frac{Pl}{4\pi r_i^2 t_d}$$

where l is the length of the drum between bearing centers. Y is

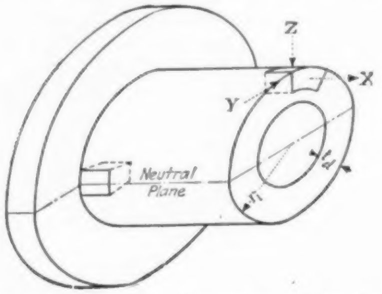


FIG. 5 DIAGRAM FOR STUDY OF STRESSES IN HOISTING-DRUM BODY

a pressure due to the rope tension; on the basis of a uniform distribution of this load over the entire drum body,

$$Y = -\frac{mP - \Sigma(P')}{vt_d},$$

v being the pitch or spacing of coils.

$$Z = \frac{Yt_d}{r_i} = -\frac{mP - \Sigma(P')}{vr_i}$$

The shear due to the twisting moment is a maximum when the rated load P is acting on the outermost layer that can be wound on the drum. Denoting the radius to the center of this layer by r_m, and substituting in the usual torsion formula, the shear is equal to, approximately,

$$W = \frac{Pr_m}{2\pi r_i^2 t_d}$$

The X and Y stresses can be combined with the shear W, giving the principal normal stresses and the maximum shearing stress

$$\frac{1}{2}\sqrt{(X - Y)^2 + 4W^2} \ldots\ldots\ldots\ldots\ldots [9]$$

From these are derived the true normal stresses

$$X' = \frac{q-1}{q} \times \frac{X+Y}{2} + \frac{q+1}{q} \times \frac{\sqrt{(X-Y)^2 + 4W^2}}{2} - \frac{Z}{q} \quad [10]$$

$$Y' = \frac{q-1}{q} \times \frac{X+Y}{2} - \frac{q+1}{q} \times \frac{\sqrt{(X-Y)^2 + 4W^2}}{2} - \frac{Z}{q} \quad [11]$$

$$Z' = Z - \frac{X}{q} - \frac{Y}{q} \ldots\ldots\ldots\ldots\ldots [12]$$

To solve for t_d it is only necessary to make the proper substitutions in the equations for X, Y and Z, then to substitute these in Formulæ [9], [10], [11] and [12], solve, and take the result which is numerically largest as the correct value for the thickness. When the allowable tensile and compressive stresses are different, as in the case of cast iron, it may be assumed that X' represents a tensile, and Y' a compressive, stress. The sign of Z' depends largely upon the relative values of X and Y, and in general Z' will be small if based upon a value of t_d obtained by solving Formulæ [10] or [11].

Consider now the second cube, located in the neutral plane of the drum body. The stresses Y and Z are the same as before; but X reduces to

$$X = \frac{N - C}{2\pi r_i t_d}$$

since the bending moment at this point is zero; and W becomes

$$W = \frac{Pr_m}{2\pi r_i^2 t_d} + \frac{P}{2\pi r_i t_d}$$

where the first term represents the shear due to torsion, as before, and the second term the maximum shear due to bending. By making the same substitutions as in the previous case, the correct value of t_d may be found for the drum body at either end.

EXPERIMENTAL INVESTIGATION OF AXIAL THRUST

The apparatus used for this work is shown in Fig. 6, a being the drum, which is fastened rigidly to the shaft c supported in bearings d, d. An adjustable flange b divides the drum into two parts. The left end of the drum is without a flange, but close to it is placed the separate flange e, which has an easy sliding fit on the shaft but is made to turn with it by means of the pin f. Any axial load against this loose flange is transmitted through the knife edge g to the lever h, fulcrumed at i and bearing upon platform scales at j; thus by balancing the scales a quantitative indication of this side thrust can be obtained for any number of turns of rope upon the drum. The number of turns is shown by the dial k, and can be varied by turning the shaft by means of the capstan l. The platform and weights m produce whatever rope tension may be desired; and the necessity of a deep shaft in which these weights may rise and fall is obviated by passing the free end of the rope through the sheave n and back on the right-hand end of the drum, so that as it is wound on the left or testing end it is unwound from the right or storage end, and vice versa.

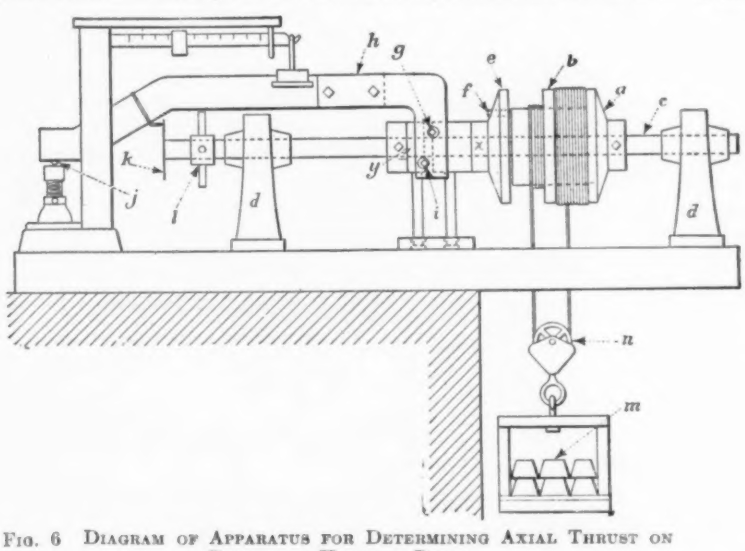


FIG. 6 DIAGRAM OF APPARATUS FOR DETERMINING AXIAL THRUST ON FLANGE OF HOISTING DRUM

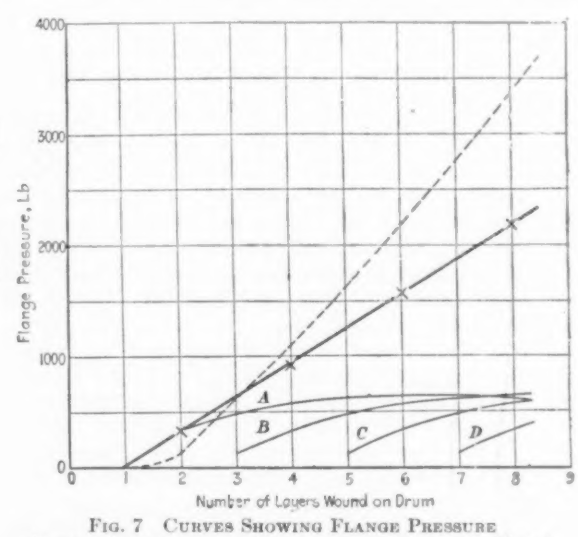


FIG. 7 CURVES SHOWING FLANGE PRESSURE
(Rope pull, 256 lb.; rope, 1/4 in., 6 by 19; pitch of coils, 5/16 in.)

The following procedure was used in making the tests: The

desired size of rope was attached to the drum, a sufficient length being used to fill the left end of the drum to the outside of the flange. One complete layer was wound on the testing end of the drum, the required spacing having been obtained by fiber liners placed between adjacent coils, at close intervals around the circumference of the drum body. It would, of course, have been possible to space the coils by grooving the drum, but this would have limited the apparatus to one size of rope. The desired weight was then placed on the hanging platform, and all was in readiness for a test run. In making a run the shaft was first turned a small amount, varying from 10 to 360 deg., during which time a portion of rope was wound upon the testing end of the drum; the bight of rope hanging below the drum was then given two or three smart hammer blows to cause the new coils to settle well in place, and the scale beam was balanced and reading recorded. This was repeated until the testing end was practically filled with rope. The small turning intervals, 10 deg., 30 deg. and the like, were

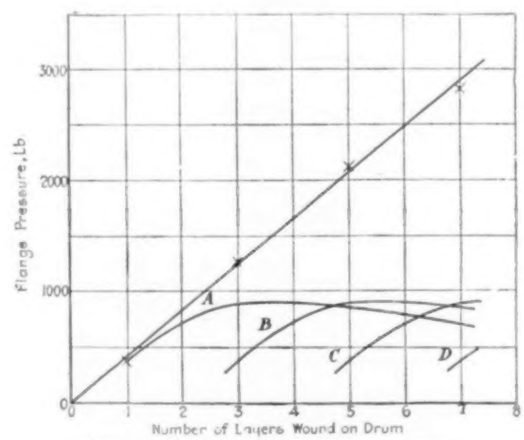


Fig. 8 Curves Showing Flange Pressure
(Rope pull, 256 lb.; rope, $^1/_4$ in., 6 by 19; pitch of coils, $^1/_4$ in.)

used only for the coils near the loose flange, as practically all of the increase in axial thrust occurred when these coils were wound on. For the remaining coils, readings taken for each revolution of the drum were considered sufficient.

A marked periodic rise and fall in the scale readings occurred during each revolution of the drum. This was undoubtedly due to a slight camber in the shaft, with possibly some additional effect caused by untruth in the bearing surfaces x and y, Fig. 6, since the phase of this periodic change varied somewhat as the axial thrust increased. On account of its periodic nature, the error could be corrected by simply taking averages of the readings obtained during each revolution of the shaft.

TABLE 1 VALUES OF P' FOR VARIOUS LAYERS IN TERMS OF THE INITIAL TENSION P

Number of Layers	1					2					3				
h (see note)	0.6	0.7	0.8	0.9	1.0	0.6	0.7	0.8	0.9	1.0	0.6	0.7	0.8	0.9	1.0
P_1'/P	0.00	0.00	0.00	0.00	0.00	0.30	0.35	0.40	0.45	0.50	0.13	0.13	0.13	0.13	0.13
P_2'/P	..	..	..	..	..	..	..	..	..	..	0.56	0.62	0.67	0.71	0.75
P_3'/P	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
P_4'/P	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
P_5'/P	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Number of Layers	4					5					6				
h (see note)	0.6	0.7	0.8	0.9	1.0	0.6	0.7	0.8	0.9	1.0	0.6	0.7	0.8	0.9	1.0
P_1'/P	0.05	0.04	0.04	0.03	0.03	0.02	0.03	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
P_2'/P	0.21	0.20	0.19	0.18	0.17	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.02	0.01	0.01
P_3'/P	0.62	0.67	0.71	0.75	0.78	0.23	0.22	0.20	0.19	0.17	0.08	0.07	0.05	0.05	0.04
P_4'/P	..	..	..	..	..	0.64	0.68	0.72	0.75	0.78	0.23	0.22	0.20	0.19	0.17
P_5'/P	..	..	..	..	..	..	..	..	..	..	0.64	0.68	0.72	0.75	0.78

Note: The value of h is given by the following formula., where a = area of wires in rope; E = modulus of elasticity of rope, E' = transverse modulus of elasticity of rope, m = coefficient of lateral deformation of rope, r = average radius of coils under consideration:

$$h = \frac{aE}{E'r^2}\left(\frac{\gamma}{45°} - \frac{90° - \gamma}{45°}m\right)$$

Figs. 7 and 8 show the results of two of these tests in graphic form. In each figure, curve A indicates the flange pressure opposite the first layer, curve B the flange pressure against the third layer, etc. The heavy curve shows the total flange pressure, and the dotted curve gives the total pressure as computed by Formula [3]. A surprising difference in flange pressures is evidenced by a comparison of Fig. 7 with Fig. 8, where the rope pulls are the same, but the coils are wound close instead of being separated. The writer attributes this to a difference in the winding characteristics of the two cases: When the coils are separated to simulate the effect of a grooved drum, they are wound on in each layer in approximately helical form; but when they are closely packed, each coil is a true circle except for an arc of about 30 deg. in which space the advance to the position of the next coil takes place. This means that the arc of cross-over, in which the coils are self-sustaining, is longer for the space than for the closely packed arrangement of coils; hence the flange pressure is less. Furthermore the closely packed coils are in contact with each other at six points, instead of four points, per coil; consequently there is a less pronounced rope flattening in the interior layers, with a correspondingly higher flange pressure as a result.

This latter effect could be taken account of in Formula [3], by selecting the values of P'/P in Table 1 which correspond to higher values of the lateral deformation factor m. As the writer did not have the time to obtain experimental values of m, he considered it best to omit the theoretical curves from Fig. 8.

At least two conclusions may be drawn from the tests: First, the actual flange pressure increases, roughly, in direct ratio with the number of layers, whereas the theoretical pressure (neglecting friction and rope flattening) is represented by a curve with rising slope; so that at eight layers the actual is only a tenth or less

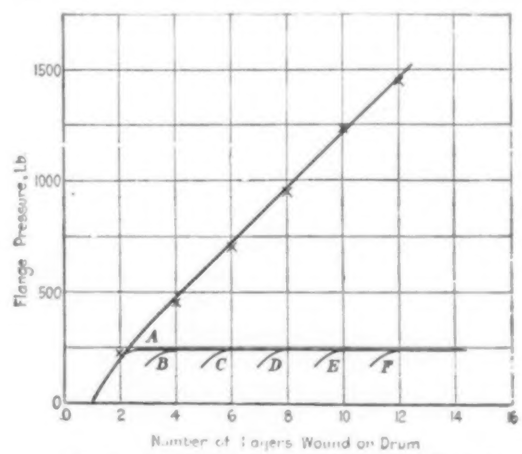


Fig. 9 Curves Showing Flange Pressure
(Rope pull, 56 lb.; rope, $^1/_8$ in., 6 by 7; pitch of coils, $^5/_{32}$ in.)

part of the theoretical pressure. The plotted points in Figs. 7 and 8 might be taken to indicate a drooping curve for the actual pressure, but Fig. 9, where four additional layers are shown, points rather to a straight-line relation. Second, the results obtained with Formula [3], and shown in Fig. 7 by a dotted curve, show a fair degree of correspondence with the test curves, and err for the most part on the side of safety. In plotting the dotted curve, E' was taken at 9260 lb. per sq. in., m at 0.3, and μ at 0.2, all of which are high values. Lower values would be more truthful and would make a still closer agreement of the dotted curve with the test curves.

The question naturally arises: If the tests indicate a straight-line relation between the flange pressure and the number of layers of rope, what value is there in a complicated expression such as Formula [3], which brings in several indefinite quantities like μ, p, E' and m? The answer is that the tests show merely a few results from a very wide range of possible conditions; whereas the formula, by taking into account a large number of variables, should be applicable to all conditions, whether the number of layers, rope pull, coefficient of friction, etc., be large or small. The field is still open for further experimentation, using larger rope sizes and greater rope pulls, and the quantities E' and m should be accurately determined for different sizes and lays of rope. The writer hopes that this work can be undertaken in the near future, and that the results will stand as an additional check upon the theoretically derived relation between rope pull and flange pressure embodied in Formula [3].

Steam vs. Electric Locomotives

Joint Meeting in New York for the Discussion of the Relative Advantages of Modern Steam and Electric Locomotives Has a Record Attendance—Papers and Discussion by Leading Authorities in the Railroad Field

A CONTROVERSIAL subject, if timely, always draws a crowd. On the evening of October 22, in the Engineering Societies Building, New York, the controversial subject was provided and the crowd was there. The meeting was under the joint auspices of the Professional Section on Railroads of the A.S.M.E., the Metropolitan Section of the A.S.M.E. and the New York Section of the A.I.E.E.; and the subject was Steam vs. Electric Locomotives. The attendance was a record-breaking one—every seat in the large auditorium was taken, 200 were standing and 400 or 500 were turned away. The curtain raiser was by Frank J. Sprague, the father of electric railroading, who briefly reviewed certain features connected with the development of electric railroads and the electric locomotive, after which were given the three papers of the evening, followed by the discussion which lasted until nearly midnight. The brief (in the legal sense) for the steam locomotive was presented by John E. Muhlfeld, vice-president, Railway and Industrial Engineers, Inc., New York, and the case for the electric locomotive was presented by A. H. Armstrong and F. H. Shepard, representing respectively the General Electric and Westinghouse companies. The discussion was summed up by George Gibbs, consulting engineer, Pennsylvania Railroad. Space permits the publication of abstracts only of the three papers and a running account of the discussion.

Remarks by Frank J. Sprague

Mr. Sprague, in tracing the history of railway electrification in America, read a news item from a copy of the New York *Sun* published in August 1887, recording the trial of an electric car on Fourth Avenue, New York, which it said "created an amount of surprise and consternation from 32d Street to 117th Street that was something like that caused by the first steamboat on the Hudson." Soon after came the famous Richmond, Va., road, fairly called the forerunner of the modern trolley. Three years later there were in operation, here or abroad, something like 350 electric trolley roads and a quarter of the street-tramway mileage of the United States had been converted to the new power.

The speaker said that so successful had been the early application of electricity to this particular problem that the wildest prophecies were made by imaginative enthusiasts of the coming debacle of the steam railway, and he found it necessary, as the incoming president of the American Institute of Electrical Engineers, in June 1892, to sound a warning in his inaugural address on the subject of The Coming Development of Electric Railways.

At that time the problem of trunk transportation was still awaiting solution and had to be preceded by another and more pressing development, that of urban rapid transit. In New York the "L" was supreme and the growth of the city was being throttled. The handicap of steam equipment had been only partially removed, and only when it became possible absolutely to disregard it and, instead, to adapt equipment and methods of operation to the possibilities of electric operation, was the success of rapid transit assured. Then were the city's shackles cast off and the modern growth of the great metropolis made possible. It was even then, however, a long time before the multiple-unit system, the fundamental of electric rapid transit the world over, received recognition.

Preliminary to the larger developments in the broad field of trunk-line operation was the construction in the early 90s by Drs. Duncan and Hutchinson, and Mr. Sprague, with the help of the Baldwin and Westinghouse companies, of a 1000-hp. electric locomotive, which, however, never saw service. Handicapped as was the transmission of power on a large scale and over long distances, until the development of the a. c. transformer and the rotary converter, and by the persistent traditions of steam practice, progress was necessarily impeded, and it was not until about 1902 that because of a grave accident the New York Central Railroad undertook its epoch-making development of a great terminal and the beginning of trunk-line operation.

Looking to the future, Mr. Sprague said: "I wish to record again my unchanging belief in the coming supremacy of electric power for transportation; and, propagandist as I have been these many years, my faith is based not upon any overwhelming claims of superior fuel economy when both are dependent on coal supply, nor upon any material saving in operating expense sufficient to pay the charges incident to the increased capital cost when considered on existing traffic density and methods of operation, but rather upon the broad ground of the overwhelmingly vital demand for *increased capacity*, a demand which ultimately can be met only by the electric system because of characteristics individual to it.

"Of course, the general electrification of trunk lines is not a matter of immediate possibility of accomplishment. It will only come as it is coming, progressively with the accelerating power of example. It will be governed very largely by financial conditions, however justified. Under sufficiently enlightened public policy, railroads might be able to assume the large added burdens incident to electrification, if given sufficient encouragement. But the test of wisdom of railway officials, financiers, and national and state governments is the ability to anticipate and plan against the inevitable before the slowing down and paralysis of traffic, such, for example, as is illustrated by the rapid-transit situation in this city, where the congestion affects the daily life and wellbeing of the whole community.

"I am not unmindful of the many and great difficulties in the way of accomplishment, nor would I have electrical engineers lose themselves in visionary contemplation of unobtainable commercial realities; but I may perhaps repeat the substance of the closing words of that address of 28 years ago, to which I have already referred:

" 'Such is the work before you, a work well meriting your best effort. Yet it is well to temper your effort with prudence. Limit your attempts to the solution of those problems which will promise practical benefit. Do not chase rainbows; they are beautiful and poetic, but they have small place in the world's economies.'

"This is said in no spirit of discouragement, for I yield to no man in my confidence in the future of electricity."

Steam vs. Electric Locomotives—the Steam Side

By JOHN E. MUHLFELD, NEW YORK, N. Y.

IN consideration of the existing traffic rates and regulations as established by the Interstate Commerce Commission, and the wages and working conditions as recommended by the Railroad Labor Board, it is assumed that the railroads as a whole will average net operating earnings equal to 6 per cent on their valuation as fixed from time to time by the Interstate Commerce Commission. Some railroads may earn more and some will earn less, but in every case the minimum fixed charge and the maximum operating and maintenance economy will be required if the stock owners are to receive even a reasonable return on their investments.

In the protection and control of railroad net earnings one of the most involved factors is the kind of motive power to be used, and, unfortunately, in appraising the relative values of steam and electric railway power, comparisons have been made between the opera-

tions of new, up-to-date electrical and of obsolete steam installations; or on the basis of other conditions which are not fairly comparable.

For example, a report was made several years ago on the advisability of electrifying about 275 miles, or a division, of one of the more prominent western lines, and an erroneous comparison was made, first, between existing antiquated and uneconomical steam and an up-to-date electric operation; and second, by omitting a statement of the investment required to bring the steam operation up to date. When all involved factors were properly adjusted the net capital expenditure of $4,000,000 required for electrification (compared with $1,000,000 needed for modernizing the steam equipment), and the estimated annual operating saving from electrification of approximately $750,000, were wiped out and replaced by a saving of $250,000 from a continuation of the improved steam operation.

When we discuss the further electrification of the whole or any part of the 260,000 miles of steam-operated railroad systems in the United States, which is now making use of about 65,000 steam and 375 electric locomotives for its passenger, freight and terminal service, the most essential requisite is a correct and complete statement of facts, comparing the most up-to-date steam operation with similar electric operation, after which immediately come the important factors of the necessary financing and legislation.

Financing. Few if any existing steam roads can justify the additional capital investment required per mile of road for electrification, except for short distances under very special conditions such as prevailed on the Norfolk and Western, where the ventilation and 1.5 per cent grade line features of a five-eighths-mile single-track tunnel restricted the train movements to a 6-m.p.h. basis on a congested traffic section of the main line, and even then only providing the fixed charges and operating expenses are not too excessive.

The immediate requirements of new money for the more urgent steam equipment and facilities needed to provide adequate, safe and expeditious rather than luxurious service in the regeneration of the railroads, is the obvious reason for the continued utilization of the overall more economical steam operation; and only after the possibilities in this direction have been realized can any serious financial consideration be given to the proposed radical change to superelectrification.

Adaptability to Existing Trackage and Facilities. First and foremost in the advantages of a continuation of the existing improved steam locomotive for all purposes for which it is permissible, is its flexibility and adaptability to existing railroad trackage and terminal and operating facilities, and the relatively low first cost at which it can be purchased per unit of power developed for the movement of traffic. Being a self-contained mobile power plant, it is possible quickly to transfer needed or surplus power from one part of the line to another and to concentrate it when and where necessary; whereas, with the electric locomotive this is impossible unless electrification extends over the entire property or the sources of power supply have almost prohibitive peak-load capacity. Furthermore, the various systems of electrification make the interchanging of electric locomotives impracticable without much nonproductive first cost, complication, and maintenance and operating expense.

Effectiveness in Increasing Track Capacity. Without doubt electrification increases the capacity of a terminal, as evidenced by the intensified traffic movements at Grand Central Station in New York, and at Broad Street Station in Philadelphia; but an analysis of the situation on the New York Central shows that this is not due to decreasing locomotive movements through the use of multiple units as is usually stated. For example, through-line passenger trains are handled in and out of Harmon with single steam the same as with single electric locomotives; and as regards commutation service, this is largely a motor-car proposition, as indicated by the fact that the New York Central has 241 motor cars (and no trailers) as compared with 73 electric locomotives.

Special line conditions, as on the Norfolk and Western, may make electrification advisable for short distances, but neither the results on that road nor at the New York terminals justify the assumption frequently made that electrification would have obviated the difficulties experienced in steam-locomotive haulage during the unprecedentedly cold weather and severe traffic conditions of the winters of 1917–1918. If otherwise, why did the New Haven not operate at 100 per cent of its capacity over its electrified zone at that time? If short of locomotives or motor cars the New York Central had plenty of surplus that was not in use and which could not be utilized outside of its electric zone where it was badly needed. The probable answer is lack of interchangeability, which is still one of the most discouraging operating factors involved in any electrification scheme, as brought out in the last report of the A.R.A. Committee on Design, Maintenance and Operation of Electric Rolling Stock, wherein the wide variation of current-generating, transmitting, distributing and contact systems, voltages, types of locomotives and of general ideas relating to the features sets forth the present undeveloped state of the art.

Furthermore, in the handling of heavy-tonnage trains by the unlimited combining of electric-locomotive units, the factors of peak load, transmission lines, and power-plant capacity must all be considered, with the probability that permissible modern steam-locomotive train units can be more economically handled over dense traffic lines than the electric multiple-unit super-trains. Although under the multiple-unit system of locomotive and train operation it is theoretically possible to provide unlimited sustained hauling capacity at the head of the train, the tonnage to be handled without rear-end or intermediate helpers is limited by the ability of the draft rigging on the cars to withstand the pull and shock. This limitation can be readily met and exceeded in steam-locomotive design and operation, as may be noted from the following comparison of the St. Paul electric freight and the Virginian steam freight articulated types of locomotives:

TABLE 1 COMPARISON OF MODERN TYPES OF ELECTRIC AND STEAM LOCOMOTIVES

	St. Paul Electric Articulated	Virginian Steam Articulated
Tractive power, in simple gear, maximum	132,500 lb.	176,600 lb.
Tractive power, in compound gear, maximum	....	147,200 lb.
Tractive power, at 15 miles per hour	71,000 lb.	108,000 lb.
Wheel arrangement (excluding tender)	4–8–8–4	2–10–10–2
Length over all (including tender)	112 ft.	107 ft.
Total wheelbase (including tender)	102 ft. 8 in.	97 ft. 0 in.
Driving wheelbase	75 ft. 0 in.	64 ft. 3 in.
Rigid wheelbase	10 ft. 6 in.	19 ft. 10 in.
Total weight on driving wheels	448,000 lb.	617,000 lb.
Total weight on truck wheels	116,000 lb.	67,000 lb.
Total weight of tender (with 1/2 fuel and water capacity)	....	148,000 lb.
Total weight of locomotive	564,000 lb.	832,000 lb.
Truck wheels—total No.	8	4
Driving wheels—total No.	16	20
Driving wheels—diameter	52 in.	56 in.
Driving wheels—adhesive weight to total	79.4 per cent	90 per cent
Driving wheels—adhesive weight per axle, avg.	56,000 lb.	61,700 lb.
Driving wheels—unsprung weight per axle, avg.	16,250 lb.	12,000 lb.
Factor of adhesion—maximum tractive effort	3.38	3.49
Factor of adhesion—tractive effort at 15 m.p.h.	6.31	5.70
Source of power	Electricity from outside hydroelectric plant	Superheated steam from self-contained boiler plant

Train Speeds. The averge freight car is in main-line movement only about 10 per cent of its life, or 2 hr. 24 min. out of each 24 hr. The balance of its time can be distributed as follows: 55 per cent in the hands of the railroads on account of interchanges, yard and loading and unloading track movements, surplus cars, repairing tracks, and road delays; and 35 per cent in the hands of the shipper and consignee, due to loading and unloading reconsignment and Sundays and holidays. Therefore, increasing train speeds beyond established economic limits at the sacrifice of tonnage, and with an increase in fuel, track and equipment upkeep and danger of operation, is not the solution of the freight-traffic problem. For example, an increase of 50 per cent over and above the established economic freight-train speeds would be only 72 min. of the daily life of each freight car; whereas, capital expenditures applied to the reduction of those delays which now involve, over $21^1/_2$ hr. per day, or about 90 per cent of the life of the car, would give much more effective and economical results.

As the electric locomotive is a constant-speed proposition, whether going up or down grade, and is unable to utilize its rated capacity and effectiveness through the same range of speed and tractive-power variations as the more flexible steam locomotive, the latter can, therefore, be more efficiently operated over the continually changing up and down grades, levels, curves and tangents traversed by the average freight train in this country.

With respect to passenger-train service, where speed is more of

a factor, the steam locomotive performs equally satisfactorily. For example, on the main line of the Baltimore and Ohio, for a distance of 17 miles between Piedmont, West Virginia, and Altamont, Maryland, the average gradient is 2.2 per cent. A single Pacific-type locomotive with a tractive power of 43,400 lb. will haul up this grade in 50 min., without helper, or at an average speed of 20 m.p.h., a passenger train consisting of 9 cars weighing 620 tons without locomotive and 830 tons with locomotive. The same train will make the trip down grade in 35 min., or at an average speed of $28^1/_2$ m.p.h. The total weight of engine and tender of these Pacifics is 210 tons, which may be compared with a total weight of 265 tons for the St. Paul electric locomotives used to handle similar passenger trains up 17 miles of 2.2 per cent grade from the Columbia River west at an average speed of 25 m.p.h.

Fuel Consumption. [Under this heading the author refers to figures which have been quoted in support of electrification on the basis of a coal rate of $2^1/_2$ lb. per kw-hr. at the central station in combination with a 40-kw-hr. rate at the point of delivery of the power to the railroad system, resulting in a train movement of 1000 average gross ton-miles for 100 lb. of coal of about 12,000 B.t.u. In commenting on this, he says that in arriving at these data apparently numerous factors were overlooked or disregarded which should be included in any estimate of the power requirements and coal rates for an electrified system. Continuing, he says:]

However, accepting the assertion that the proposed electrification will produce 1000 gross ton-miles for an average of 40 kw-hr., or 100 lb. of 12,000-B.t.u. coal, as stated and generally approved by electrical engineers, what can the modern steam locomotive do to justify its existence?

Dynamometer-car tests may be cited, made by a Joint Committee of representatives of the New York Central and Pennsylvania railroads and the American Locomotive Company during August 1910, of the first Mallet-type of locomotive put into use on the Pennsylvania Division of the New York Central and operated over the 65 miles of average 0.5 per cent grade line between Avis and Wellsboro Junction. This locomotive was built ten years ago and by no means represents the best practice of the present day when superheat has been increased and a more efficient all-around machine is produced. At that time the average of six runs gave a thermal efficiency of 6.01 for the locomotive, and the following test made on August 27, 1920, is representative:

Miles run, about	65
Cars in train, No	65
Cars in train, tonnage	3,734
Running time	4 hr. 35 min.
Time on road	6 hr. $51^1/_2$ min.
Average speed, m.p.h.	12.9
Thermal efficiency of locomotive	6.25 per cent
Dry coal per drawbar horsepower-hour	2.90 lb.
B.t.u. in dry coal as fired	14,053
Cut-off	....
Drawbar horsepower	1,270.4
Drawbar pull	34,071 lb.
Steam pressure in branch pipe	203.3 lb.
Superheat in branch pipe	143.7 lb.
Machine efficiency of locomotive	89.21 per cent
Boiler efficiency	69.07 per cent

Furthermore, the 2-6-6-2 type Mallet steam locomotives with tractive power of about 88,500 lb. in compound, and 106,200 lb. in simple gear, operated over a distance of about 155 miles of average 0.3 per cent grade line with a ruling grade of 0.6 per cent 13 miles long, between Birmingham, Ala., and Columbus, Ga. During this period steam was used about 50 per cent of the time, the locomotive drifting the balance of the time, and a figure of 1000 gross ton-miles was realized from 106 lb. of coal of approximately 13,000 B.t.u. which compares quite favorably with the foregoing hypothetical figures given for electric operation.

The results of some dynamometer-car tests made during 1918 may also be of interest. At that time the steam locomotives tested were of the ordinary superheated Mikado freight type of the following general description:

Weight on driving wheels	110 tons
Weight on truck wheels	32 tons
Cylinders, simple	25 in. by 32 in.
Driving wheels, diameter	56 in.
Steam pressure	200 lb.
Tractive power	59,600 lb.

One locomotive was fitted for hand firing and burning coal on grates, while another was equipped with the "Lopulco" system for burning powdered coal in suspension, and the tests were made in tonnage freight service handling from 2400 to 2600 tons east-bound and from 1850 to 2250 tons west-bound on the Santa Fe main line between Ft. Madison, Ia., and Marceline, Mo. (the profile consisting of 0.8 per cent ruling grades) a distance of 112.7 miles. The coal averaged from 1 to 8 per cent moisture, 33 to 38 per cent volatile, 51 to 41 per cent of fixed carbon, 15 to 12 per cent ash, 4 to $3^1/_2$ per cent sulphur, and from 12,055 to 11,050 B.t.u. as fired. The comparative average results are given in Table 2.

TABLE 2 TESTS ON MIKADO FREIGHT-TYPE SUPERHEATER LOCOMOTIVES

	Powdered-Coal Locomotive	Hand-Fired Locomotive
Total trips run (112.7 miles each)	14	10
Total miles run	1578	1127
Average running time, hours	5.06	5.25
Average dead time, hours	1.25	1.01
Average total time, hours	6.31	6.26
Average speed, m.p.h	22.3	21.6
Average trailing tonnage per train	2278	2283
Average gross 1000 ton-miles	256.5	255.4
Average coal per gross 1000 ton-miles	82.4	114.8
Average superheat, deg. fahr	223	173
Average coal per boiler and superheater, coal per hp-hr	3.74	4.99
Average B.t.u. per pound of coal as fired, lb	12,025	11,160

As the coal supplied to the grates of the hand-fired locomotive was considerably lower in heat value than that specified in the electrification project, and as the tests were run during March and April, it can be assumed from the foregoing that the average yearly performance will approximate 100 lb. of 12,000-B.t.u. coal per 1000 gross ton-miles, or equivalent to what we are promised for the expenditure of billions of dollars of new capital and the loss of billions of dollars of investment in existing plant and equipment to inaugurate electrification.

Efficiency of Locomotive Operation. It is unquestionably true that when operating under ideal fixed-load conditions, the central power station, either hydroelectric or steam, can produce a horsepower with less initial energy input than is possible on a steam locomotive. It is also true that the stand-by losses on existing steam locomotives are, in ordinary practice, a serious proportion of the total fuel consumption; but it is likewise a fact that the majority of these can be substantially reduced, if not entirely overcome, by modernizing the present equipment and improving maintenance and operation.

The number of factors entering into an analysis of the net thermal efficiency of the electric locomotive, in terms of drawbar pull, are so many as to make it impossible with the lack of dynamometer-car and laboratory test data to arrive at a figure which is not based on a number of assumptions; but as a matter of interest, assuming, that *all of the factors are affected equally* in the electric locomotive, the net thermal efficiency at the drawbar, when taking into consideration the boiler, engine, generator, step-up transformer, a.c. transmission, step-down transformer, a.c.-d.c. converter, d.c. transmission, motors, and machine efficiencies may, as representative of average existing practice, be illustrated as in Table 3.

TABLE 3 ANALYSIS OF NET THERMAL EFFICIENCY OF ELECTRIC LOCOMOTIVE

		Load Rating, Per Cent		
Equipment:		100	75	50
Boiler	Factor	...	...	...
	Efficiency	76.7	76	72
Engine	Factor	18.25	18.29	19.17
	Efficiency	14	13.9	13.8
Generator	Factor	90	89.5	86
	Efficiency	12.6	12.44	11.88
Transformer, Step-Up	Factor	98	96	90
	Efficiency.	12.34	11.93	10.67
Transmission, A.C	Factor	90	95	97
	Efficiency	11.10	11.32	10.34
Transformer, Step-Down	Factor	98	96	90
	Efficiency	10.87	10.85	9.30
Converter, A.C. to D.C	Factor	80	75	63
	Efficiency	8.69	8.13	3.85
Distribution, D.C	Factor	90	95	97
	Efficiency	7.82	7.71	5.66
Motors, D.C	Factor	91.5	90.8	89.5
	Efficiency	7.15	7.00	5.05
Machine Efficiency	Factor	81	85	90
	Efficiency	5.79	5.95	4.54

Likewise the net thermal efficiency of existing representative steam locomotives, in terms of drawbar pull, may be illustrated as in Table 4.

TABLE 4 ANALYSIS OF NET THERMAL EFFICIENCY OF STEAM LOCOMOTIVE

Equipment:	Steam Used:		Load Rating, Per Cent 100	75	50
Boiler	Superheated	Factor	...	...	...
		Efficiency	42.7	54.9	65.9
	Saturated	Factor	...	...	...
		Efficiency	45.0	57.4	70.0
Cylinders	Superheated	Factor	11.9	11.0	10.5
		Efficiency	5.08	6.04	6.92
	Saturated	Factor	7.8	8.4	7.8
		Efficiency	3.51	4.82	5.46
Machine	Superheated	Factor	75	80	85
		Efficiency	3.85	4.83	5.86
	Saturated	Factor	77	80	82
		Efficiency	2.70	3.86	4.47

Comparing the electric and steam locomotive figures as illustrated, the relative percentage of power delivered at the track rails to 100 per cent B.t.u. in the coal would be as given in Table 5.

TABLE 5 COMPARISON OF THERMAL EFFICIENCY OF ELECTRIC AND STEAM LOCOMOTIVES

	Net Thermal Efficiency at Load Ratings of		
Kind of Locomotive:	100 Per cent	75 Per cent	50 Per cent
Electric	5.79	5.95	4.54
Steam, Superheated	3.85	4.83	5.88
Steam, Saturated	2.70	3.86	4.47

As 100 per cent load rating conditions would, in practice, occur only momentarily and as the majority of the drawbar load represents from 30 to 60 per cent of the locomotive maximum drawbar capacity, comparison should be properly made only of the net thermal efficiencies at 50 per cent load ratings.

[As a check on the foregoing figures upon steam operation, the author presents a table (not here published) in which is given the results of tests on representative types of steam passenger and freight locomotives. In respect to these he says:]

It will be noted that at speeds of from 15 to 75 miles per hour the thermal efficiency of existing superheated-steam locomotives actually ranges from 5.3 to 8.1 per cent as compared with the calculated figures of from 4.83 to 5.88 per cent for 75 and 50 per cent load ratings, respectively. Adding to this an increase of from 15 to 50 per cent in net thermal efficiency that may be produced from the various developments now under way and the steam locomotive of the future will be quite a respectable assembly of engineering efficiency.

Cost of Enginemen. Under existing conditions each electric locomotive must carry a motorman, and a second man comparable to the fireman of a steam locomotive, although not functioning as such. The wage of the latter is an added expense without economic return and must be charged to the cost of firing the central power-station boilers or otherwise distributed.

Cost of Maintenance. In determining the maintenance cost of the electric locomotive, a true comparison can only be made by including all elements corresponding to those found in the self-contained steam locomotive, which goes back to the upkeep of all facilities having to do with the utilization of the fuel or water power, including the central power-station buildings; boilers; engines; conversion, transmission, distributing and contact-line systems; substations; track rail bonding and insulation; electric disturbance cutouts or neutralizers; extra expense in upkeep of the electric zone trackage; and like auxiliaries, and finally the electric locomotive itself.

With particular reference to the maintenance-cost figures that have been given as applying to the New York Central, Michigan Central, Pennsylvania and St. Paul railroads for the years 1913 to 1918, inclusive, and which range from \$3.78 to \$10.87 per 100 locomotive-miles run, these no doubt apply to the electric locomotive units only, and if so would appear exceptionally high even for relatively new-built steam locomotives. Until a true reflection of the upkeep cost per electric locomotive, or per 1000 gross ton-miles hauled, can be given by including all the factors and elements of age and mechanism that are embodied in the steam locomotive, comparisons will be worthless.

Peak-Load Conditions in Relation to Traffic Requirements. In order to meet the ideal conditions for electrification, the traffic should be uniformly scattered over the 24-hr. period, whereas in the majority of cases train movement is based on traveling and shipping conditions and cannot be advanced or delayed in order to eliminate peak-load conditions. That this cannot be done in order to maintain a straight-line power demand can be illustrated by citing the condition that exists in any large industrial center where freight accumulates and is switched during the day period and the out and inbound train movements concentrate in fleets, principally in the evening and morning, respectively, and cause peak-load requirements at those times.

Ease of Starting Trains. Due to the uniform torque as developed by the electric locomotive, its adherents have laid great stress on its ability to start a heavier train than a steam locomotive of relatively the same tractive power and factor of adhesion. In steam-railroad service the locomotive is seldom required to start "the train," but what it does is to start each car in the train, successively, which nullifies this theoretical advantage of the electric locomotive. In fact, with steam locomotives of the Mallet and other types having compound cylinders equipped with properly designed simpling devices, the starting power is increased about 20 per cent as compared with electric locomotives of equivalent road rating.

Rate of Acceleration. In order that the desired running speeds can be reached in the minimum time after the starting of trains, the ability of a locomotive to rapidly accelerate its load is of considerable importance, and in this respect the electric power has had the advantage. The steam-locomotive engineer, however, has not lost sight of this fact and improvements already made in boiler and cylinder horsepower ratios, as well as developments now undergoing for utilizing existing non-productive adhesive weight and increasing the coefficient of friction between the propelling wheels and the track rails will enable the steam locomotive to duplicate the performance of its electric competitor in this regard.

Train Braking. Since the development of regenerative braking with the electric locomotive, great emphasis has been laid on the increased security of operation which this permits over heavy-grade lines. Considerable attention has also been directed to the saving brought about through the elimination of the ordinary air braking on such down grades.

The Baltimore and Ohio has successfully and safely handled with steam locomotives its heavy tonnage and dense traffic on the Cumberland and Connellsville Divisions for many years, and this tonnage descends a grade averaging approximately 2.2 per cent for 17 miles, at an average speed of from 15 to 20 miles per hour for freight and from 25 to 30 miles per hour for passenger trains, without slow-downs or stops. This performance is comparable with that on the worst grade conditions encountered in the St. Paul electrified zone.

While the regenerative system of braking can no doubt be developed to the point where it can be safely used, the recent serious accident on the St. Paul wherein a heavy-tonnage freight train made up with an electric locomotive at the head end and a steam Mallet helper locomotive at the rear end, broke away from the latter and derailed the entire train of about 65 cars on a 20-mile grade of 2.2 per cent, due to the failure of the regenerative brake control, makes problematical just what economy will result. When the power so generated cannot be directly used by another pulling locomotive on the line, it must be otherwise absorbed, and it remains for the electrical engineers to prove just how much of it is lost in conversion or by absorption and the resulting net gain as compared with the investment, fixed charge and upkeep and operating cost for the equipment involved.

Effect of Weather Conditions. Even though the full steaming capacity, horsepower, and drawbar pull of a modern steam locomotive can be developed during cold-weather conditions, there are the factors of radiation and freezing to be reckoned with, which gives the electric locomotive the advantage in winter, particularly as its effectiveness is greater on account of the lesser tendency for the motors to overheat. This winter advantage, however, is largely overbalanced during the summer when the main motors heat, especially under overloads, and require cooling at terminals; or by overheating lead to insulation breakdowns, burn-outs, or other troubles.

Road Delays and Tie-Up. While the electric locomotive has the advantage of not being required to take on fuel and water except for the operation of steam-heating equipment for passenger

trains, with the increased capacity of the modern steam-locomotive tenders, and the lower water and fuel rates per drawbar horsepower developed, the delays due to taking on these supplies have been greatly reduced and need not be serious.

Barring collisions, wrecks and like accidents not due to the system of motive power in use, steam operation is not susceptible to complete tie-ups as is the case with electrification, where short-circuits or failures occur due to rains, floods, storms and like causes, and as the result of motor, wiring and insulation heating, deterioration and breakdowns, as the individual mobility of each piece of motive power without regard to any outside source of power enables quick relief.

Terminal Delays. The examination of reports of a dense heavy-freight-traffic railroad in the Eastern District shows the time of its steam locomotive for a recent two months' period distributed as follows:

1	In road service	50 per cent of total time
2	At terminals waiting trains and otherwise in hands of transportation department	26.4 per cent of total time
3	At terminals in hands of mechanical dept.	23.6 per cent of total time

There is no doubt but that the electric has an advantage over the steam locomotive as regards time required for periodical boiler work, fire cleaning and rebuilding, fueling and watering except where fuel oil is used, but where terminal delays occur due to waiting for trains, the time required for such work does not become an expensive determining factor in the daily average miles to be obtained per locomotive.

Steam vs. Electric Locomotives—the Electric Side

By F. H. SHEPARD,[1] PITTSBURGH, PA.

THE limit to physical expansion of railroad lines and of terminals has been just about reached in many cases, both on account of the prohibitive cost and the inefficiency of terminals of unworkable size. A large measure of relief can still be secured by line and terminal revisions and improvements, but when the inevitable increase in the demand for traffic movement of the future is considered, these improvements savor more or less of expedients to secure relief which can only be temporary and very limited in degree.

The great need of the country (and this is coming to be more and more generally understood) is the free and expeditious movement of our traffic. The yearly average of 22 miles per day for a freight car for the whole country, with monthly averages of as low as five miles on some of our most congested railroads for a single month, emphasizes the fact that this is a problem that somehow, someway, we must solve. The solution lies to a large extent in railroad electrification.

With the present standards of train make-up, classification and terminal handling, electrification will double the capacity of any railroad. With the better equipment we can expect in the future, together with the evolution of improved methods of operation contingent on electric power, this capacity should be doubled again, thus securing four times the present capacity. This should certainly be accepted as a vision of the future, and why not our aim? Unless some broad and consistent program is embraced, the situation, which is serious indeed today, may well be calamitous tomorrow.

The electric locomotive has generally, thus far, been a mere substitute for the steam locomotive, although in some cases, due to the greater power of the electric locomotives, there has been modification of the handling of traffic.

Two conspicuous cases of this have been the Norfolk & Western and the Chicago, Milwaukee & St. Paul. In the case of the Norfolk & Western, two electrics handle the same train as was formerly handled by three Mallet engines, but at twice the speed. In this operation, owing to the great increase in hours of road service as well, one electric locomotive is the practical equivalent of four of the Mallet engines replaced.

On the Chicago, Milwaukee & St. Paul the notable change has been elimination of intermediate terminals on the electrified section between Harlowton, Montana, and Avery, Idaho, 440 miles long. There is at present a single intermediate engine terminal, but the latest passenger locomotives are detached from trains at this terminal for inspection and work only, about once in each eight or ten trips. On regular schedule these engines make a run of 440 miles each day, being taken off for inspection at Deer Lodge after mileage varying from three to five thousand miles. On occasion, when due to a schedule derangement engines have been maintained in continuous road service for periods of 30 hours for a full day of 24 hours, mileage records of up to 766 miles in this mountain service have been established.

The advantage of electric power is its great flexibility and mobility. The difference between locomotives, steam and electric, is fundamental. The steam locomotive carries its own power plant, while the electric locomotive, on the other hand, is simply a transformer of power. The design of the steam locomotive is circumscribed utterly by the necessity of tying up the rest of the machine to a steam boiler. On the other hand, the electric locomotive assembly can differ amazingly as to type, length, axle loading and driving connections. A group of small motors does not differ materially in efficiency from a single large motor. The speed and power of an electric locomotive, therefore, is limited only by conditions of track and construction and condition of car equipment. It thus becomes entirely practicable to build an electric locomotive to take any train which will hold together, over any profile whatever, and at any desired speed. It should easily be practical to increase very greatly the speed of our freight trains so that they would all run at a common speed not very different from that at which the superior trains are operated.

Again, with the retirement of the lighter and weaker car equipments, a material increase in the weight of trains will be realized. Without the limitation in train speed commonly accepted as a handicap to operation of tonnage trains, who can say what the limit to train load will be with electric power? In fact, the character of railroad operation which may be secured with electric power has not yet been visualized. Every other industry that has been electrified has experienced a revolution in methods and service due to electrification. This should be equally true in the case of the movement of our railroad traffic.

Our present methods have been built up entirely under the necessities and limitations of the steam locomotive. This is evidenced by the existence of intermediate terminals at the ends of all the so-called engine districts, where all traffic halts. Again, the steam locomotive requires attention en route, needs supplies of water and coal, and because of its slow movement when hauling our present tonnage trains, it is frequently sidetracked for superior trains, and thus there are more and still more halts to traffic.

Car inspection now takes place at the terminus of each engine district. If under condition of electric operation the engine district can be increased to 200, 400 or even 500 miles, is there any good reason why car inspection should not be eliminated at the present intermediate terminals? In fact, is not the general standard of maintenance of equipment of doubtful value on the present basis of inspection at each 100-mile interval? Cars in subway service, which is certainly full of potential hazard, are economically and reliably maintained, although inspected at intervals of one to three thousand miles. The elimination of these intermediate terminals, with the resultant necessity of keeping the train moving on the main line, would secure an enormous increase in miles per car with a corresponding saving in equipment.

Furthermore, with the dispatch obtained in handling trains, movement could be so marshalled and scheduled that the necessity of storing goods at terminals to protect exports and local con-

[1] Director of Heavy Traction, Westinghouse Electric and Mfg. Co.

sumption would be largely eliminated, and terminals would then become, in fact as in fiction, open instead of closed gateways.

[The author here introduced a general statement upon the comparative performance of steam and electric locomotives which is omitted in this abstract in view of the fact that Mr. Armstrong's paper is devoted largely to this phase of the subject and covers the ground quite thoroughly.—Editor.]

There are a considerable number of different designs of electric locomotives all in successful operation, and each possessing certain advantageous features. Further experience will undoubtedly result in the survival of common types for the different classes of service. The great latitude with which electric locomotives can be designed, while fundamentally most desirable, is in itself at the present time somewhat of a handicap. This is now the subject of intensive analysis and this study will undoubtedly develop a better knowledge of the running characteristics of the steam locomotive.

To state the case briefly, we are all interested in the transportation problem. Electrification is bound to be the most potent factor for its relief. We should therefore invite and embrace the closest coöperation with the engineering and mechanical skill which has been so productive in the steam-locomotive field.

Steam vs. Electric Locomotives—the Electric Side

By A. H. Armstrong,[1] Schenectady, N. Y.

A comparison of the modern steam and electric locomotive leads immediately to a discussion of the relative fitness of the two types of motive power to meet service conditions. At present railway practice has closely followed steam-engine development, but are we not justified in looking at the transportation problem from the broader standpoint of a more powerful and adaptable type of motive power?

It is not merely a question of replacing a Mikado or Mallet by an electric locomotive of equal capacity. The economies thus effected are in many instances not sufficient in themselves to justify a material increase in capital account. The paramount need of our railways today is improved service, and this can be brought about by introducing the more powerful, flexible and efficient electric locomotive.

Possibilities of Design

Owing to handicap of precedent and prejudice, electricity must take up the railway problem where steam leaves off. In other words, the proof is up to the electrical engineer proposing any marked departure from commonly-accepted standards as established by long years of steam-engine railroading.

The following table gives the commonly accepted constants in locomotive design. While a maximum standing load of 60,000 lb. per axle has been generally accepted for steam engines, it is

Commonly Accepted Constants

Limiting gross weight per axle	60,000 lb.
Limiting dead weight per axle	18,000 lb.
Limiting coefficient adhesion running	18 per cent
Limiting coefficient adhesion starting	25 per cent
Ruling gradient	2 per cent
Maximum curvature	10 deg.
Maximum rigidwheel base	18 ft
Maximum speed on level—passenger	65–70 m.p.h.
Maximum speed on level—freight	25–30 m.p.h
Maximum drawbar pull	150,000 lb.

well known that an impact of at least 30 per cent in excess of this figure is delivered to rail and bridges due to unbalanced forces at speed. Impact tests taken on electric locomotives of proper design disclose the feasibility of adopting a materially higher limiting weight per axle than 60,000 lb. without exceeding the destructive effect on track and road-bed now experienced with steam engines. However, owing to the flexibility of electric locomotive design, there is no immediate need of exceeding present steam practice in this respect, although this and other reserves may be called upon in the future.

Accepting the Mikado and Mallet as the highest developments of steam road and helper engines for freight service, the following

Comparison of Steam and Electric Locomotives

Type	Mikado 2–8–2	Mallet 2–8–8–2	Electric 6–8–8–6
Wt. per driving axle	60,000 lb.	60,000 lb.	60,000 lb.
No. driving axles	4	8	12
Total wt. on drivers	240,000 lb.	480,000 lb.	720,000 lb.
Total wt. loco. and tender	480,000 lb.	800,000 lb.	780,000 lb.
Tract. eff. at 18 per cent coeff.	43,200 lb.	86,400 lb.	129,600 lb.
Gross tons 2 per cent grade	940	1,880	2,820
Trailing tons 2 per cent grade	693	1,495	2,430
Speed on 2 per cent grade	14 m.p.h.	9 m.p.h.	16 m.p.h.
Hp. at driver rims	1,620	2,080	5,570
I.hp. at 80 per cent eff.	2,030	2,600	...
Trailing tons-miles per hr. on 2 per cent gradient	9,700	13,500	38,800

general comparison is drawn with an electric locomotive that it is entirely practicable to build without in any respect going beyond the experience embodied in locomotives that are now operating successfully.

The above analysis brings out the fact that to equal the hourly ton-mile performance of one electric locomotive it would require three and four engine crews, respectively, for the Mallet and Mikado types. Furthermore, the electric performance as tabulated above can be obtained with each individual locomotive practically regardless of climatic conditions, efficiency of the crew or time that has elapsed since shopping; and with a demonstrated reliability that has set a new standard in railroading.

Mountain Service

The electric locomotive has demonstrated its very great advantages in relieving congestion on single-track mountain-grade divisions. The number of meeting points on a single-track line increases as the square of the number of trains operating at one time and is proportional to the average speed, so it will be appreciated what an advance in mountain railroading is opened up by the adoption of the electric locomotive.

The hazard of mountain operation is greatest on down grades, although the perfection of automatic air brakes has done much to modify its dangers. It is left to electricity, however, to add the completing touch to the safe control of descending trains by supplying regenerative electric braking. Not only are air brakes entirely relieved and held in reserve by this device, but the potential energy in the descending train is actually converted into electricity which is transmitted through the trolley to the aid of the nearest train demanding power. Aside from the power returned from this source (14 per cent of the total on the Chicago, Milwaukee and St. Paul Railway), the chief advantage of electric braking lies in its assurance of greater safety and higher speeds permitted on down grades. The heat now wasted in raising brake shoes and wheel rims often to a red heat is returned to the trolley system and becomes an asset instead of a likely cause of derailment.

Cost of Maintenance

In order to draw a fair comparison, there should be added to the maintenance charges for locomotives the cost of back shop repairs and all expenses of roundhouse, turntable, ashpit, coal and water stations—in fact the many items contributing to rendering necessary steam-engine service, as most of these charges are eliminated by the adoption of the electric locomotive. Spare parts can be substituted so quickly that, excepting in cases of wreck, there is no need of the back shop, for electric locomotives, unless turning tires and painting may be considered heavy repairs. Electric locomotives are now being operated 3000 miles between inspections on at least two electrified railways and the following figures are available:

Electric-Locomotive Maintenance, Year 1919

	N. Y. C.	C. M. & St. P.	B. A. & P.
Number locomotives owned	73	45	28
Locomotive weight—tons	118	290	84
Annual mileage	1,946,879	2,321,148	566,977
Repairs per mile	6.39 cents	14.65 cents	6.48 cents

On the basis of prewar prices, maintenance costs were approximately 60 per cent of above figures given for the year 1919. In contrast, it can be stated that the present cost of maintaining a type 2–8–8–2 Mallet is fully 60 cents per engine-mile, without

[1] Chairman, Electrification Committee, General Electric Company.

including many miscellaneous charges not shared by the electric locomotive. Possibly more direct comparison may be better drawn by expressing maintenance in terms of driver weight.

Steam and Electric Repairs

	Steam Mallet	C. M. & St. P. Electric
Cost repairs per mile	60 cents	14.65 cents
Weight on drivers	240 tons	225 tons
Cost repairs per 100 tons locomotive weight on drivers	25 cents	6.52 cents

Including all engine service charges, the facts available give foundation for the claim that electric locomotives of the largest type can be maintained for from 25 to 30 per cent of the upkeep cost of steam engines operating in similar service.

Fuel Saving

Fuel economy figured prominently among the several reasons leading up to the replacement of the steam engine on the Chicago, Milwaukee and St. Paul Railway as brought out by a careful analysis of the performance of the steam engines then in service.

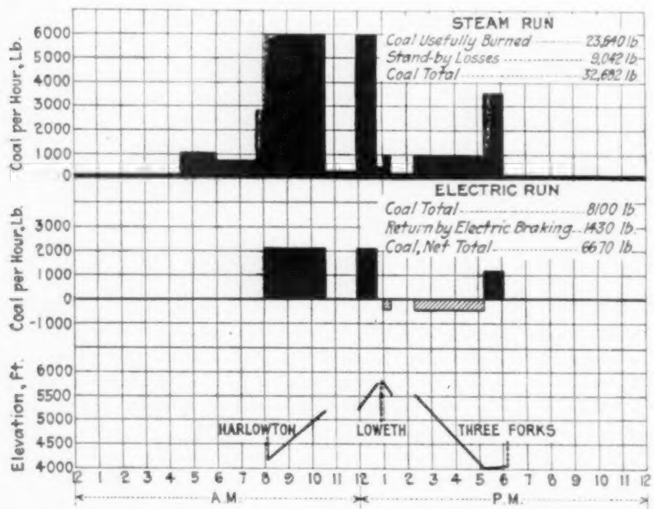


Fig. 1 Coal Record for Steam and Electric Runs from Harlowton to Three Forks, 1000 Gross Tons Moved

Although the steam engines tested may now perhaps be considered obsolete and not within the scope of this discussion of the modern engine, nevertheless it is not without value to compare the results of steam and electric locomotives operating over such long distances under identical conditions. The following data as given in Fig. 1 are therefore submitted as applying to a particular equipment only. No claim is made that they are representative of the best modern steam-engine performance, although many thousands of steam engines still in operation will show no greater economies than those given in the following table. The general data applying to the steam and electric locomotives tested are as follows:

C. M. & St. P. Locomotive Test Data

Type	Steam 2–6–2	Electric 4–4–4–4–4–4
Weight of engine	206,000 lb.	568,000 lb.
Weight of tender	154,000 lb.	...
Weight total engine and tender	360,000 lb	568,000 lb.
Weight on drivers	152,000 lb.	450,000 lb.
Ratio driver weight to total	42.2 per cent	79.3 per cent
Rigid wheelbase	13 ft.	10 ft. 6 in.
Diameter drivers	63 in.	52 in.
Cylinders	21 in. × 28 in.	...
Boiler pressure	200 lb.	...
Heating surface	2346 sq. ft.	...
Grate area	45 sq. ft.	...
Water capacity	8000 gal.	...
Coal capacity	14 tons	...

Other engines were also tested over other sections of track, but the particular runs recorded in Fig. 1 were chosen for illustration as bringing out most strikingly the inherent disadvantages of operating a steam engine over a single-track mountain-grade division and handicapped by the usual delays attending freight-train service under such conditions. The run of 111.1 miles from Harlowton, elevation 4162 ft., to Three Forks, elevation 4066 ft., over the Belt Mountain Divide at Loweth, elevation 5789 ft., was made by steam with 871 tons trailing in 26 cars and by electric locomotive hauling 64 cars weighing 2762 tons. In order to picture a direct comparison of the results of the steam and electric runs, test data are reduced to a common basis of 1000 gross tons moved, this unit of measurement including the locomotive and tender weight. The running speed of the electric train was but slightly higher than the steam and the additional correction in the power demand rate of the former is made proportional to the lower speed. Both runs are therefore shown as made in identical time on the basis of 1000 total gross tons moved in each instance. The fuel furnishing power to the steam train was coal having the following analysis:

Coal Analysis

Fixed Carbon	Volatile Carbon	Ash	Moisture	B.T.U.'s
47.99	38.98	8.35	4.68	11,793

Electric power was furnished by water and hence no direct coal equivalent is provided by the test result. To afford a common basis of comparison, however, a single assumption seems permissible and a rate of $2^1/_2$ lb. of coal per kilowatt-hour is taken as representative of fair electric power-station practice. Power input to the electric locomotive was obtained by carefully calibrated recording wattmeters as well as curve-drawing volt and ampere meters. These values of locomotive input were raised to the value of three-phase power purchased in the ratio of 68 per cent (given by R. Beeuwkes in his A.I.E.E. Paper of July 21, 1920), and the kilowatt-hours so obtained reduced to coal equivalent in the ratio of $2^1/_2$ lb. coal per kw-hr.

The run of a more modern steam engine would have effected a material reduction in the 23,640 lb. of coal burned in doing useful work, but the amount of coal wasted in stand-by losses (9042 lb.) might have been duplicated or even possibly increased with larger grate area. As standby losses constitute so large a proportion of the coal total burned ($27^1/_2$ per cent in this instance) it is apparent that enormous economies over the simple engine tested must be realized in the modern superheater and other improvements since introduced to offset in part the high inherent efficiency of the electric locomotive.

[In his complete paper the author gives a further analysis of the foregoing test in which he deduces comparative figures for coal per hp-hr. at driver rims and total coal per rim hp-hr., showing still more favorably for the electric locomotive. He estimates that whatever transmission and conversion losses are interposed between power house and electric locomotive are more than compensated for by the improvement in load factor resulting from averaging the fluctuating demands of many individual locomotives. —Editor.]

It would be a simple matter to carry through a series of runs over the electrified zone of the C. M. & St. P. with a modern Mikado equipped with all the up-to-the-minute fuel-saving devices and thus provide the necessary data to draw direct comparisons with the electric locomotive. Such tests with modern steam equipment would undoubtedly discredit the above comparison based upon the economies of six years ago and might lead to something approximating the following blend of fact and theory:

Theoretical Comparison of Modern Steam and Electric Locomotives
Harlowton—Three Forks

Type	Mikado 2–8–2	Electric 4–4–4–4–4–4
Weight on drivers	240,000 lb.	450,000 lb.
Weight engine and tender	480,000 lb.	568,000 lb.
Tractive efficiency, 18 per cent coefficient	43,200 lb	81,000 lb.
Trailing ton 1 per cent grade	1,420	2,836
Hp-hr. at driver rims	4,360	8,200
Coal per i.hp-hr	3	...
Coal per driver hp-hr	3.75	...
Stand-by loss—test result	9,042 lb.	...
Stand-by loss per hp-hr	2.15 lb.	...
Total coal per driver hp-hr	5.90 lb.	...
Coal at power house kw-hr	...	2.5 lb.
Coal at power house hp-hr	...	1.86 lb.
Coal at locomotive driver hp-hr	...	3.09 lb.
Coal credit due regeneration	...	0.55 lb.
Net coal at driver hp-hr	5.90 lb.	2.54 lb.
Total net coal	24,800 lb.	20,900 lb.
1000 trailing ton-miles	157,500	314,000
Coal per 1000 ton-miles	158 lb.	66.7 lb.
Ratio coal burned	2.37	1

The above table is based upon actual electric-locomotive performance, Harlowton—Three Forks, coal taken at $2^1/_2$ lb. per kw-hr. at assumed steam power station. Steam-engine values are based upon the known working efficiency of a Mikado equipped with superheaters, but penalized with the same stand-by losses actually determined with simple engine tested on the Harlowton—

Three Forks run. A test run from Harlowton to Three Forks with a modern Mikado engine hauling 1420 tons may possibly show a lower average fuel rate than 3 lb. per i.hp-hr. at drivers, less stand-by waste than 9042 lb. coal, but the average annual performance of many such engines would be most excellent if it reached the net figure arrived at of 5.9 lb. coal per actual hp-hr. work performed at drivers. The electric run, however, is being duplicated daily, as to relation between kilowatt-hours and ton-miles, and it is just this reliability of electric operation that may at times give rise to misunderstanding in the comparison of steam and electric data.

Each individual electric locomotive will reproduce almost exactly the record of all others in similar service, little influenced by either extreme cold or skill of the engineer, while the fireman so-called and still retained, has nothing to do with the matter at all. There is no creeping paralysis gradually impairing the efficiency of an electric locomotive until temporary relief is obtained through frequent boiler washings and roundhouse tinkering, inevitably ending up in the major operations annually performed on the steam engine in the back-shop hospital to keep it going. It is for such reasons that the electrical engineer is slow to accept general statements of average service operation based on the results of tests usually made on steam engines in excellent condition and skillfully handled.

It is with some knowledge of all these facts that the broad statement is made that the general adoption of the electric locomotive would probably result in saving fully two-thirds the fuel now burned on present steam engines and possibly one-half the amount of fuel necessary to steam engines of the most modern construction.

Comparative Cost

The superior operating advantages of the electric locomotive are admitted by many who believe the first cost to be prohibitive, largely due to the trolley construction, copper feeders, substations, transmission lines, etc., necessary to complete the electrification picture. It is true that such auxiliaries add an amount that may equal the electric-locomotive expense and the task of proving the electric case is not made easier by the fact that steam-engine facilities are already installed and may have little or no salvage value to offset new capital charge for electrification.

Comparing the cost of equivalent steam and electric motive power, it is apparent that on the basis of the same unit prices for labor and material, the first cost is approximately the same. While electric locomotives cost possibly 50 per cent more than steam for equal driver weight, the smaller number required to haul equal tonnage may quite offset this handicap, especially with quantity production of electric locomotives of standard design.

The steam engine also demands a formidable array of facilities peculiar to itself as shown by expenditures made on fourteen railways included in the northwestern group from 1907 to 1919, in which the expense for engines was $68,000,000 and for water stations, shops, enginehouses, shop machinery, turntables, ash-pits, etc., was $42,000,000.

DISCUSSION

H. B. Oatley[1] suggested that the respective merits of steam and electric locomotives should be considered from the point of view of the return on the capital investment. Modern types of both steam and electric locomotives, he said, must be compared with each other, and the losses in the operation of the one compared with similar losses in the operation of the other. Mr. Oatley expressed his confident belief that the improvements in the steam locomotive, many of which are past the experimental stage and are beginning to be applied as part of regulation equipment, would result in making the steam locomotive so much better, from a fuel and efficiency standpoint, that combined with the other points of advantage which it possesses it would be enabled to retain its superiority.

F. J. Cole[2] called attention to the slow progress which has been made in the United States toward superseding the steam locomotive. Records showed that in April 1919 there were 675 electric locomotives operating in the country. It seems, therefore, that in the 27 years since the building of the first electric locomotive only one per cent of the steam locomotives have been superseded by electric locomotives. Mr. Cole insisted that the relative merits of steam and electric locomotives must be determined largely on the basis of cost. He said that the reports of electrifications do not give costs of installation. The questions that should be answered are: Is it cheaper to operate by steam or by electricity, and can freight per ton-mile be moved at less cost, when all expenditures are considered, by electricity than by steam?

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[2] Chief Consulting Engineer, American Locomotive Co., New York. Mem.Am.Soc.M.E.

C. H. Quinn[1] presented comparative figures of fuel consumption on the electrified division of the Norfolk & Western Railroad and on modern Mallet engines under similar operating conditions. The figures showed a fuel saving of 29.3 per cent in favor of electric operation.

A. L. Ralston[2] gave data on the thermal efficiency of the 3000-volt direct-current system. On the electrified section of the New York, New Haven and Hartford Railroad the efficiency at full load is 8 per cent; at 75 per cent load, 7.8 per cent; and at 50 per cent, 7.4 per cent. In passenger service, 9.3 lb. of coal are consumed per car-mile on the electrified section, and 19.3 lb. per car-mile on the steam-operated section. The net saving through electrification is thus $393,000 a year, assuming coal to cost $5 a ton. In freight service, electric locomotives consume 84 lb. of coal per 1000 gross ton-miles, while steam locomotives average 199 lb. per 1000 gross ton-miles, the saving being $268,000 a year. The corresponding figures in switching service are 38.3 for electric and 106.8 for steam locomotives, and the saving in this service $94,000. The electrification therefore effects an annual gross saving in the cost of fuel amounting to $755,000.

F. H. Hardin[3] said that the maintenance costs of New York Central Mallet locomotives, including shop and enginehouse repairs, were from 24 to 37 cents per mile, as against the estimate of 60 cents offered by Mr. Armstrong. Also that Mr. Armstrong's estimate of 158 lb. of coal consumption per 1000 gross ton-miles for Mikado locomotives is disproved by the records of locomotives of this type operated by the New York Central Railroad, which have shown a coal consumption of 125 to 130 lb. per 1000 gross ton-miles.

W. L. Bean[4] summed up the comparative advantages and disadvantages of both steam and electric locomotives. Electrical operation requires less coal per unit of traffic handled than steam operation. The mileage per unit of electric equipment is ordinarily greater per unit of time. The first cost of electric locomotives per unit of capacity is greater than in the case of steam. Large electric locomotives cannot be used for heavy local service because of the heating caused by frequent starting. In such service the maximum train which can be handled by an electric locomotive can only approximate what can be handled by a steam engine of about 30,000 lb. tractive effort. As regards design, the discusser contrasted the steady development of the steam locomotive along lines of possible common usage and practice with the vast field of opinion among electrical engineers as to types of installation. He hoped that the lines of development of electrical facilities would tend to converge rather than diverge too widely.

In conclusion, Mr. Bean said that study and comparison of the details, item for item, of any large activity, is necessary in order to get the benefit of real analysis, but satisfactory conclusions as to the merits of the entire project cannot be reached by setting up in a partisan way outstanding advantages on the one hand any more than by listing all the disadvantages on the other. Certain more or less intangibles are important and must be weighed impartially. Among such are the increase in real-estate value through electrification, increased capacity of road, comparative safety and reliability of operation, permanence of type of design, obsolescence and depreciation factors, etc. Tangibles from a money standpoint can and should be segregated and set up in full

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[2] Mechanical Superintendent, N. Y., N. H. & H. R.R.
[3] Chief Engineer of Motive Power, N. Y. Central R.R.
[4] Asst. Mechanical Superintendent, N. Y., N. H. & H. R.R., New Haven, Conn. Mem.Am.Soc.M.E.

scope on both sides of the case and conclusions based on the net result at the bottom line of the balance sheet. If fixed charges on plant, including equipment, plus maintenance charges, plus other outgo, outweigh the savings in fuel plus other operating savings, the net result is a deficit and all manner of proclaiming isolated pecuniary advantages would not induce a careful investor to support the enterprise.

R. Beeuwkes[1] dissented from the statements made by Mr. Muhlfeld in regard to the electrification of the Chicago, Milwaukee and St. Paul Railway. The Virginian steam articulated locomotive, he stated, could not justifiably be compared with the St. Paul electric articulated, as each was designed for an entirely different service and operated under entirely different conditions. The St. Paul locomotive was designed to provide capacity sufficient to handle a 2500-ton trailing load over any portion of the profile without helper on grades of one per cent or less, at a speed of approximately 16 miles per hour. It was not built with the idea of securing the maximum capacity possible, as it appeared to Mr. Bean that Mr. Muhlfeld had implied. In addition, Mr. Bean insisted that fuel economy is not the most important claim for electrification. He referred to decreased cost of engine repairs, enginehouse expenses, train and enginemen wages and increased ton-mile capacity of the electric locomotive as of more importance. Other advantageous features he mentioned were ability to carry overloads and ease of starting trains.

W. F. Kiesel,[2] Jr. submitted experimental data to show that electric operation does not save coal. He said that with the exception of capital investment, coal per drawbar horsepower and stand-by losses, there is too little difference between the two types for operation in open country to warrant further consideration. He also said that, for either steam or electric operation, the length of divisions and locations of terminals are governed by other than locomotive limitations.

E. B. Katte[3] produced a table which showed that fuel-consumption data are apt to be misleading in so far as comparisons are concerned, due to widely different conditions on the various roads in question. He cautioned against placing too much reliance on results obtained from test runs, notwithstanding the fact that they fairly simulate actual conditions. He advised that instead, service records extending over several years should be used, and the data carefully collected, correlated and averaged to give results that may be expected in everyday operation.

George Gibbs[4] contrasted the two kinds of power plants for conducting railway transportation from the standpoints of both design and performance. In steam service, he said, the plant is a part of the moving train; in electric it has both stationary and moving elements, viz., a central power-generating plant, various connecting links to bring the power to the train, and means of utilizing it there. As regards simplicity, therefore, the self-contained steam locomotive has an inherent advantage over the combination of elements required for electric propulsion, and the latter must show some peculiar advantages in an *operating,* rather than a *structural,* sense if it is to supersede steam traction. Furthermore, the steam locomotive has been developed to a perfection of detail and a high degree of steam accuracy during the one hundred years of its use; it does wonderful work and is in possession of the field representing a heavy money investment, and therefore can only be displaced, even by something better, by slow degrees. He contended that electrical as well as mechanical engineers must, in the light of evidence furnished by existing installations, concede than an electric system will function in a successful, reliable and efficient manner for any kind of railway service. It is capable of unlimited hauling capacity, is flexible as to speed and has important features conducing to safety in handling trains. But in his opinion the fundamental question affecting the adoption of electric locomotive is whether or not its substitution for steam is warranted by its advantages in the production of more transportation, and if so, whether this is practicable financially. It will be found, he said, that electric traction will pay, directly or indirectly, in special cases to an extent depending upon the density of traffic and the difficulty of maintaining proper steam operation. As it is unquestionable that an electric installation involves a higher first cost than for steam, its adoption means that more or less existing investment must be scrapped, and therefore the increase in fixed charges must be offset either by the direct operating savings produced or these plus the indirect savings and benefits. The final conclusion arrived at by Mr. Gibbs was that there is always a large saving in fuel with electric traction, generally some saving in maintenance cost of power equipment and often important savings in train-crew costs, enginehouse expenses and minor supplies.

A. W. Gibbs[1] submitted data for a 2–10–0 type steam locomotive of which over 100 are in regular service, which he stated, represent better practice than the locomotives referred to by Mr. Armstrong in the second table of his paper. He said that these locomotives were expressly designed to do all of their work within the economical range of steam distribution, the required power being obtained by increases in steam pressure and size of cylinders. While he had given the power at nearly the speed mentioned by Mr. Armstrong, the performance was excellent at double the speeds given, but the sacrifice in drawbar pull—from nearly 60,000 lb. at 14.7 m.p.h. to about 43,000 lb. at 25.3 m.p.h.—would not be justified. In brief, the improvements in the steam locomotive, if properly availed of, have much narrowed the field of economical electrification.

Data on 2–10–0-Type Steam Locomotive

Weight in Working Order	371,000 lb.
Weight on Drivers	342,050 lb.
Weight on Engine and Tender	523,000 lb.
Tractive Effort at 14.7 miles per hour, 45 per cent cut-off	58,900 lb.
Gross Tons (2 per cent grade)	1,280
Trailing Tons	1,019
Coal per D.H.P. at this speed and cut-off	2.8
Tractive Effort at 22 miles per hour, 40 per cent cut-off	42,500 lb.
Gross Tons	923
Trailing Tons	662
Coal per D.H.P	3.2
Tractive Effort at 25.4 miles per hour, 45 per cent cut-off	43,600 lb.
Gross Tons	948
Trailing Tons	687
Coal per D.H.P	3.8

The same arrangement of limited maximum cut-off used in the 2–10–0 locomotive has been embodied in a simple Mallet now running which has the same speed elasticity as the 2–10–0 type.

Stand-by Losses. While these losses are actual and large it is very difficult to fix their value. The electric locomotive has the advantage provided there are sufficient trains in motion to smooth out the total demand on the power plant.

Weather. The independence of the electric locomotive in severe weather is another undoubted advantage, not so much because of the performance of the motors as from the avoidance of losses and delays due to ashpit work and to frozen pipes and other parts, incidental to the presence of water on the steam locomotive.

Liability to Interruption. Electric operation is dependent on uninterrupted connection with the source of power. In the event of breakage of the line, especially of the overhead construction, the trains in the section involved are dead and cannot get themselves out of the way of the repair trains.

Speeds. The question of speed has evidently been treated from the freight standpoint, for there has never been any question as to the speed capacity of well-designed passenger locomotives, being far beyond that permitted by the rules. As he saw it, the high-speed of trains was less important than uniformity of speeds of different trains. If tonnage trains had the same speed as preference trains, and could thus avoid the great delay due to side tracking of trains of inferior rights, far more would be accomplished than the mere saving in time over the division due to the increased speed.

In the maintenance cost per mile of different electric locomotives, given by Mr. Armstrong, it should be said that any figures of post-war dates are so clouded by the abnormal labor and material costs as to be very doubtful. These locomotives have not run long enough to reach a general level of costs and it would be noted that the average annual mileage is low except in the case of the Milwaukee locomotive. Besides this, there is no evidence as to the maintenance costs of the rest of the outfit, including power plant, transformers, transmission lines, converters or transformers, trolley or third-rail and track circuits, all of which are essential

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SURVEY OF ENGINEERING PROGRESS

A Review of Attainment in Mechanical Engineering and Related Fields

SUBJECTS OF THIS MONTH'S ABSTRACTS

New Analytical Theory of Water Turbines

New Analytical Theory of Water Turbines, Prof. A. Petot. Analytically, the problem therefore resolves itself to a search for the maximum value of a function of two independent variables such that their variation occurs within fairly well-restricted intervals. By selecting these variables in a convenient way all the elements of a turbine can be expressed as functions of an auxiliary unknown value given by an equation of the second degree with numerical coefficients. The author proceeds in the following manner.

As a rule in the analytical theory of water turbines it is customary to neglect losses of energy due to viscosity, friction and shocks. It is here shown how these may be accounted for with sufficient approximation and without running into excessive complications. Let H be the head of the water fall; v, u, w the absolute velocity, the velocity of entrainment and the relative velocity at the entrance to the wheel; α the angle of v with u and β the angle of w with v, continuation of u; v_1, u_1, w_1, α_1 and β_1 are the same elements for the exit from the wheel; r and r_1 are the average radii and m is the ratio r_1/r; $kv^2/2g$ and $k'w^2/2g$ the losses which have to be taken care of; ϵ is the degree of reaction of the turbine and ρ is its internal efficiency.

If one neglects certain magnitudes which are given in the problem and others such as the angles α and β_1 which must be as small as possible, the efficiency ρ is merely a function of two variables and it is obvious that these variables should be selected in such a manner that the calculation may be carried through without neglecting any important terms. As a result of his investigations the author has been led to select as such variables v and u.

The first question with which one has to deal in a calculation carried on in the manner indicated is that of expressing w_1, v_1 and ρ as functions of v and u. From the two basic equations

$$\rho g H = uv\cos\alpha - u_1 v_1 \cos\alpha_1 \qquad [1]$$

$$\rho = 1 - \frac{v_1^2}{2gH} - k\frac{v^2}{2gH} - k'\frac{w_1^2}{2gH} \qquad [2]$$

it is found that

$$gH - \frac{v_1^2}{2} - k\frac{v^2}{2} - k'\frac{w_1^2}{2} = uv\cos\alpha - u_1v_1\cos\alpha_1 \qquad [2a]$$

Equation [2a], after obvious transformations, becomes

$$(1 + k')\,w_1^2 = 2gH + m^2u^2 - 2uv\cos\alpha - kv^2 \qquad [3]$$

From a consideration of the triangle at the exit, the author obtains

$$v_1^2 = m^2u^2 + w_1^2 - 2muw_1\cos\beta_1 \qquad [4]$$

and finally from Equations [4] and [2].

$$\rho g H = uv\cos\alpha + muw_1\cos\beta_1 - m^2u^2 \qquad [5]$$

The desired equation is thus obtained without neglecting any terms. However, in order not to complicate the computations too much it is advisable to preserve for the time being w_1 as an auxiliary variable, bearing in mind, however, that in due time it can be gotten rid of by means of Equation [3].

Determination of the Optima Values of v and u

The two partial derivatives $\frac{\partial\rho}{\partial u}$ and $\frac{\partial\rho}{\partial v}$ of ρ must be reduced to zero value, which involves the use of Equation [5] and also of w_1. These latter may be deduced from Equation [3], which gives

$$\left.\begin{aligned}(1 + k')w_1\frac{\partial w_1}{\partial u} &= m^2u - v\cos\alpha \\ (1 + k')w_1\frac{\partial w_1}{\partial v} &= -u\cos\alpha - kv\end{aligned}\right\} \qquad (a)$$

Now, equating in succession to zero the expressions $\frac{\partial\beta}{\partial u}$ and $\frac{\partial\rho}{\partial v}$ there are obtained from these two equations

$$\left.\begin{aligned}(1 + k')w_1(v\cos\alpha - 2m^2u) + m\cos\beta_1(2gH + {}&\\ 2m^2u^2 - 3uv\cos\alpha - kv^2) &= 0 \\ (1 + k')\,w_1\cos\alpha - m\cos\beta_1(u\cos\alpha + kv) &= 0\end{aligned}\right\} \qquad (b)$$

which together with Equation [3] determine the optima values of u and v, and also the corresponding value of w_1. If in the first of these two equations w_1 be replaced by its value

$$w_1 = \frac{m\cos\beta_1}{(1 + k')\cos\alpha}(u\cos\alpha + kv) \qquad [6]$$

from the second equation there results an equation of state

$$uv\left(\cos\alpha + \frac{m^2k}{\cos\alpha}\right) = gH \qquad [7]$$

which differs but little from the equation given by Poncelet.

Proceeding now in the same manner, from Equations [6] and [7] we obtain

$$m^2u^2\cos^2\alpha\,(k' + \sin^2\beta_1 - kv^2[m^2k\cos^2\beta_1 + (1 + k')\cos^2\alpha] + \frac{2m^2kgH\cos^2\alpha(k' + \sin^2\beta_1)}{\cos^2\alpha + m^2k} = 0 \qquad [8]$$

which thus provides a system of two quadratic equations for determining the two principal unknown values v and u.

On the other hand, in order to verify a priori Equation [7], the author places

$$v^2 = \frac{gH\cos\alpha}{\cos^2\alpha + m^2k} \times x \qquad [9]$$

and

$$u^2 = \frac{gH\cos\alpha}{\cos^2\alpha + m^2k} \times \frac{1}{x} \qquad [10]$$

in which x designates the auxiliary unknown quantity equal to $\frac{v}{u}$. If these values of v^2 and u^2 are inserted in Equation [8], then

$$x^2\left(k\cos^2\beta_1 + \frac{1 + k'}{m^2}\cos^2\alpha\right) - 2x\cos\alpha\,(k' + \sin^2\beta_1) - \cos^2\alpha\,\frac{k' + \sin^2\beta_1}{k} = 0 \qquad [11]$$

which is of quadratic character and has numerical coefficients.

It has also real roots with opposite signs and it is evident that the positive root x' is the only one that suits the case. From this we can pass to v and u, and all the rest can be deduced, as will be shown by comparatively simple numerical computations which can be carried out with such approximation as may be desired.

Calculation of the Other Elements of the Turbine

The degree of reaction ϵ is given by the usual formula

$$1 - \epsilon = \frac{(1 + k)v^2}{2gH} \quad [12]$$

or else by

$$1 - \epsilon = \frac{(1 + k)x' \cos \alpha}{2(\cos^2 \alpha + m^2k)} \quad [12 \text{ bis}]$$

which can be directly deduced therefrom. In order that the value of ϵ be positive it is necessary that

$$\frac{(1 + k)x' \cos \alpha}{2(\cos^2 \alpha + m^2k)} < 1 \quad [c]$$

or else

$$x' < \frac{2(\cos^2 \alpha + m^2k)}{(1 + k) \cos \alpha} \quad [13]$$

For this it is necessary that when x is the first member in Equation [11] to be replaced, the result obtained should be positive. Hence, there must be between the elements α, β_1, m, k and k' a characteristic inequality of operation with reaction. The author does not attempt to give this inequality explicitly as it is quite complex, but he shows that with the usual value of the elements above referred to it is present.

The angle β is deduced as usual from the formula

$$\frac{v}{u} = \frac{\sin \beta}{\sin(\alpha + \beta)} \quad [14]$$

which, bearing in mind the values of v and u, gives

$$\tan \beta = \frac{x' \sin \alpha}{1 - x' \cos \alpha} \quad [15]$$

In order to determine the relative velocity w at the entrance to the wheel, we have the relation

$$w^2 = u^2 + v^2 - 2\,uv \cos \alpha \quad [16]$$

which may be applied under the above form or replaced by

$$w^2 = \frac{gH \cos \alpha}{\cos^2 \alpha + m^2k}\left(x' + \frac{1}{x'} - 2 \cos \alpha\right) \quad [16 \text{ bis}]$$

where only the auxiliary unknown quantity x' is used.

As regards the exit velocity w_1, it is given by Equation [6], which requires, however, the preliminary computation of v and u by means of Equations [9] and [10]; Equation [3] might also be used in the same manner. From this, we pass to the ratio w_1/w, which must be taken into consideration in order to satisfy the conditions of continuity and to obtain the desired degree of reaction.

With w_1 known, one might also compute v_1 by means of Equation [4] and then the angle α_1 by considering the triangle of velocities at the exit. These two elements, however, are not used in the course of this investigation and, therefore, are merely mentioned for the sake of completeness. The former may have to be determined, if it should be desirable to know how the total loss of efficiency is distributed between the three negative members of Equation [2] and angle α_1, to compare its actual value with the values which have been attributed to it in accordance with the investigations of Euler and Poncelet and which are usually accepted today.

It is now necessary to determine only the internal hydraulic efficiency ρ which is obtained by means of Equation [5], where, however, v' is replaced by its value given by Equation [6] and also uv by their values obtained from Equation [7]. This gives

$$\rho = 1 - \frac{m^2(k' + \sin^2 \beta_1)}{1 + k'}\left(\frac{u^2}{gH} + \frac{k}{\cos^2 \alpha + m^2k}\right) \quad [17]$$

where for u^2 may be substituted its value from Equation [10], which gives

$$\rho = 1 - \frac{m^2(k' + \sin^2 \beta_1)\left(\frac{1}{x^1} \cos \alpha + k\right)}{(1 + k')(\cos^2 \alpha + m^2k)} \quad [17 \text{ bis}]$$

When the characteristic inequality has been verified, it is necessary to adopt operation with reaction in order to secure maximum efficiency, but the degree of reaction cannot be selected arbitrarily as it is fixed by Equation [12] and varies with the type of turbine. If the inequality is reduced to equality, we have a limit turbine with a zero reaction and a maximum efficiency. Should the inequality be reversed, the maximum efficiency proper to a turbine of that type could be obtained only by making the reaction negative, a case which the author does not consider at all.

Moreover, practice has shown that reaction turbines have as a rule the best efficiency, and it is likely that the characteristic inequality will be found correct in the majority of cases. This should be checked every time, however, by using Equation [13].

Furthermore, if we should admit that the coefficients k and k' both preserve the same values for all the turbines of a given type, which is likely to be true, we shall see that the idea of proportionality of turbines is presented here in as simple a manner as in the usual approximate theory. This makes it possible for us to dispense with the consideration of questions relative to the output q of the waterfall and the corresponding dimensions of turbines, as they can be considered in the same manner as is usually done.

Approximate Formulæ

Since the values of k and k' do not exceed 0.1, it is evident that in solving Equation [1] in the first approximation one may neglect entirely the term containing x and reduce the coefficient of x^2 to its second term. This gives for x' the comparatively simple approximate value

$$\xi = m\sqrt{\frac{k' + \sin^2 \beta_1}{k(1 + k')}} \quad [18]$$

from which can be derived expressions for all the elements of the turbine. For example, with the same degree of approximation one may derive the following expressions:

$$v^2 = \frac{mgH}{\cos \alpha}\sqrt{\frac{k' + \sin^2 \beta_1}{k(1 + k')}} \quad [19]$$

$$u^2 = \frac{gH}{m \cos \alpha}\sqrt{\frac{k(1 + k')}{k' + \sin^2 \beta_1}} \quad [20]$$

$$1 - \epsilon = \frac{m(1 + k)}{2 \cos \alpha}\sqrt{\frac{k' + \sin^2 \beta_1}{k(1 + k')}} \quad [21]$$

$$\rho = 1 - \frac{m}{\cos \alpha}\sqrt{\frac{k(k' + \sin^2 \beta_1)}{1 + k'}} \quad [22]$$

If necessary, the values of β, w, w_1, v_1 and α_1 may be obtained in the same manner.

If we say that ϵ as obtained from Equation [21] has a positive value, the characteristic inequality will be expressed as

$$\frac{k' + \sin^2 \beta_1}{1 + k'} < \frac{4k \cos^2 \alpha}{m^2(1 + k)^2} \quad [23]$$

which is obviously only an approximation. It appears, however, in view of the factor $4/m^2$ that it must always be fairly well satisfied in the case of centripetal turbines and even in parallel turbines. There is doubt only in reference to centrifugal turbines. This explains why, as has been said above, there is always an advantage in having operation with reaction. These various approximate formulæ cannot take the place of the preceding precise formulæ in the calculation of the elements of turbine design, but they make it possible to view along broad lines the general operation and to give the first idea of the numerical values of certain of the elements which enter therein.

Thus, Equations [21] and [22] show first (because of the factor m, the variations of which have a more or less permanent influence than the variations of k and k') that the degree of reaction must be lower for parallel turbines than for centripetal turbines and that these latter have a better efficiency. From the equation

$$\rho = 1 - \frac{2k(1 - \epsilon)}{1 + k} \quad [24]$$

which is a direct outcome of the preceding equations, it follows that the two properties of centripetal turbines, namely, the higher degree of reaction and better efficiency, are correlative with each other.

On the other hand, if we eliminate k' from between Equations [20] and [22], we obtain

$$k = \frac{(1-\rho)u^2 \cos^2 \alpha}{gH} \qquad [25]$$

which gives an approximate value of the coefficients k which will be utilized later on in this paper. The approximate value of k' might also be obtained in the same manner, but it does not appear to be of any use.

Experimental Investigation of Water Turbines

First Series of Experiments. A good many experiments have been made on water turbines, but it would be difficult to deduce with any degree of precision for each particular type of turbine the average value of coefficients k and k' because the machinery on which the experiments were carried out was designed in accordance with old formulæ. Nevertheless, by properly interpreting the results of these experiments we can obtain for k and k' what might be called the first series of values, from which a start may be made to deduce other values more or less closely approaching the true values. To demonstrate how this is done, let us assume that we have a good reaction turbine M_0 and that its various elements have been determined as precisely as possible. Equations [10], [11] and [17] are then a system of three equations with three unknowns x, k and k', which may be solved in the following manner:

Let us assume that the unknown k has been given an approximate value from Equation [25] and that we designate this value by the letter a. Then we can immediately derive from Equations [10] and [17] corresponding values b and a' for the two other unknown quantities x and k; since, however, the value a of k' is only approximate, it is evident that Equation [11] cannot be verified by these numbers a, a' and b, and hence its first term will have a certain value n, different from zero. If, however, we repeat the same calculation by giving to k another value a_1 in the neighborhood of the value a, then numerical values a', b and n will be replaced by other values a_1 b_1 and n_1 lying in the neighborhood of the former values. It is obvious that the method of interpolation can be applied here, and it is easy to see how one can obtain, with as close approximation as may be desired, values x_0, k_0 and k_0' for the unknown quantities x, k and k' of the turbine M_0.

These two numbers k_0 and k_0' are the first couple of values of the coefficients k and k' and their approximation is the closer the better the turbine M_0 is designed. The degree of precision attained in this manner in the determination of the values of the coefficients may be established by comparing M_0 to a turbine M_0' designed in accordance with the formulæ given earlier in this article, where k and k' are taken to be respectively equal to k_0 and k_0'. In this connection one is led to consider simultaneously with the constructional elements β and $\lambda = w_1/w$ of the turbine M_0, also the corresponding elements β' and λ' of the turbine M_0' and to compare them with each other.

If it should be found that β' and λ' are equal to β and λ, respectively, that will mean that the turbine M_0' is nothing else but the turbine M_0 and that hence the desired values of k and k' are k_0 and k_0' exactly. The question will therefore be immediately solved for all machines of the same type as M_0 without there being any need of further experimentation. However, there is but little likelihood that this might be the case and all that one has the right to expect is that the differences $\beta' - \beta$ and $\lambda' - \lambda$ will be very small. In that case the conditions of maximum of efficiency would not be entirely satisfied in the turbine M_0 and one would be led to look forward to a turbine M_1 which, while being very close to M_0 would have a somewhat better efficiency. This is a problem clearly different from that which has been considered above and therefore new experiments would be necessary to solve it.

Second Series of Experiments. In the first place, in accordance with what has been stated above, it becomes necessary to give to k and k' numerical values somewhat lower than k_0 and k_0'. This is, however, only the first indication of what should be done and in order to progress it is necessary to proceed by a series of trial values. Let us imagine, for example, that by taking k and k' to be equal respectively to $0.98k_0$ and $0.98k_0'$ we obtain for ρ by means of Equations [11] and [17 bis] a value which appears to be acceptable. In that case it may be used provisionally; otherwise, the values of k and k' would have to be either decreased or increased slightly by methods of interpolation, the values of $\beta' - \beta$ and $\lambda' - \lambda$ being the guides as to whether the efficiency values should be accepted.

The new values of k and k', viz., k_1 and k_1', having been selected in the above-described manner, let us now imagine that we are computing all the elements of the turbine M_1 by means of the general equations given above, that we have built the machine and that we have set it in operation under the same conditions as the turbine M_0. Then as regards the maximum efficiency and the operating velocity the distinction should be made between two sets of values—first, ρ and u computed a priori from the Equations [17 bis] and [10] and the values ρ' and u' obtain experimentally by direct measurement. In fact, by comparing ρ with ρ' and u with u' we can see with what degree of approximation the values k_1 and k_1' approach the desired values of k and k'. The reasoning is here similar to that by means of which we have passed from the first experimental turbine M_0 to the second, M_1.

Let us assume at first that ρ' and u' are respectively equal to ρ and u. The conditions of maximum efficiency having been then satisfied in the turbine M_1 the desired values of k and k' are exactly k_1 and k_1' and the experiment is satisfactorily computed. In practice it is sufficient for the same purpose that the differences

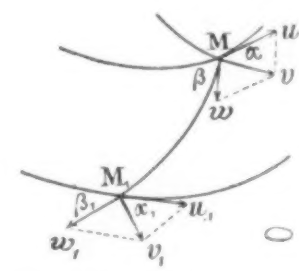

Fig. 1 Diagram of the Turbine Considered by Professor Petot

$\rho' - \rho$ and $u' - u$ should be very small, and it is likely that this might be the case if the turbine M_0 from which we have started has been well designed.

On the other hand, if these differences be quite large the experiments have to be continued. The author does not attempt, however, more than to indicate the direction of the experiments. As the turbine M_0 has been built in accordance with the general formula with values of k and k' lower than k_0 and k_0', it is likely that its effective efficiency ρ' will be somewhat higher than that of the turbine M_0. This is admitted by the author, with the reservation that should experiment show that this is not the case, the admission might be modified in the further experiments which would be easy because the same method would have to be followed.

Admitting, however, that the turbine M_1 represents from the point of view of efficiency a step forward as compared with the turbine M_0, the same manipulations are carried out with M_1 as were carried out with M_0 so as to secure a design for a third turbine M_2, which presumably would represent a step ahead as compared with M_1, and so on until a turbine is designed in which the differences between $\rho' - \rho$ and $u' - u$ are negligible, which may be considered as the end of the experiments. The important part of this process is that while more and more correct values are obtained for the coefficients k and k', the efficiency of the turbine of a given type is likewise improved.

Conclusions

In the study of water turbines, by taking for an auxiliary unknown quantity the ratio $x = v/u$ of the absolute velocity and velocity of flow at the entrance to the blades, one may carry to a final conclusion the computations of turbine design by taking into consideration all the charge losses, and without neglecting any of the terms. This unknown quantity x is given by a quadratic equation, which is not surprising, as the various methods, whether analytical or graphical, proposed for the investigation of turbine design (in particular, those of Bodmer and Rateau) come back in the final end to an approximate solution of an equation of this order.

Once, however, we have obtained the value of x for a given set

of conditions, we can deduce from it by means of comparatively simple equations all the elements of construction and operation of a turbine of a given type. Also, by neglecting in the quadratic equation of x, certain terms which are very small as compared with other terms we are enabled to derive a series of approximate formulæ, which, while not capable of replacing the exact formulæ for the computations, involved in turbine design, still enable us to obtain a preliminary idea of their general operation.

All these considerations obviously would not amount to much if we were unable to determine with sufficient approximation the values which we must attribute for each type of turbine to the coefficients of loss k and k'. Ways are, however, described and given showing how this may be done in a practical manner.

The coefficients, k and k', by the way, are not true coefficients, but functions of a large number of variables which it appears to be impossible to express in an analytical form. They may be treated as constants, however, because the functions themselves have a range of variation which is quite restricted. The same applies also to the majority of coefficients which are made use of in hydraulic problems. Because of this, it becomes necessary to determine the average values of k and k' for each type of turbine and for each new device which may be introduced therein, such as new construction of blades, where progress is still possible.

In the present article only simple turbines have been considered, but the same methods may be applied with proper variations to the more complex types. (*La Technique Moderne*, vol. 12, no. 8, Aug. 1920, pp. 332–336, *tA*.)

Short Abstracts of the Month

Errata

The direct-connected high-speed turbo-blower described in the November issue of Mechanical Engineering (p. 630) and referred to editorially on p. 644, was erroneously ascribed to the De Laval Company. This turbo-blower was built by the Rateau-Battu-Smoot Company of New York City.

In the original article in *Power*, from which the abstract in Mechanical Engineering was prepared, it was stated that the blower end of the rotor was made of a nickel-chrome-magnesium steel forging. We are now informed by the manufacturers that this forging was made of nickel-chrome *manganese* steel and not as was stated.

ENGINEERING MATERIALS

Review of the Development of Copper Steel, E. M. Buck. The claim is put forward that tests made by a Committee of the American Society for Testing Materials with the coöperation of the United States Bureau of Standards, together with other data available, proved that by alloying with normal open-hearth or bessemer steel from 0.15 to 0.25 per cent of copper, the rate of corrosion of steel is very much reduced where the products are exposed to alternate attacks of air and moisture. The author also claims that in his investigations he noticed indications which point to a better adherence of paint coatings on copper steel, resulting in a more perfect and longer-continued protection by the paint film.

The manufacture of copper steel has heretofore been largely confined to sheet metal, but it might be extended to other uses. In particular, steel freight cars are mentioned, especially those of the open kind, which suffer greatly from corrosion. (Paper before the American Iron and Steel Institute, New York meeting, Oct. 1920, abstrated through *Iron Age*, vol. 106, no. 18, Oct. 28, 1920, pp. 1109–1110, *g*)

FUEL AND FIRING

Oil-Fuel Installation, Joseph Pope, Mem.Am.Soc.M.E., and Frank G. Philo. Description of the boiler installation of the Savannah (Ga.) Electric Company which has been recently converted from coal to fuel oil and for which unusual efficiencies are claimed.

Since the adoption of fuel oil the boilers have been operated normally at about 250 per cent of their rate of capacity without a single instance of tube trouble throughout seven months of operation, notwithstanding the fact that the boiler feedwater is not entirely free from solid impurities. In the tests carried out at the plant efficiencies (gross) approximating 80 per cent at 300 per cent of boiler ratings have been obtained. Load conditions at the power station were such as to require the developent of high boiler outputs, which made the question of design of the burner of great importance. This steam-atomizing type of burner was not suitable as it gives excellent results at outputs about the rated capacity but not at the higher overloads.

As regards the mechanical-atomizing type of burner the one which had been in use for marine service had not shown as high an efficiency as even the steam-atomizing burner and did not permit to develop very high boiler ratings. The burner finally adopted was a new type developed by the Babcock & Wilcox Company. The original article does not describe its construction and only says that a specially designed orifice disk or tip is employed in which the oil is led to a central circular perforation through tangential grooves and thus attains a violent rotary motion as it is projected through the orifice. The resulting spray takes the form of a widely diverging cone of extremely fine mist. The burner proper is set in the furnace wall at the center of an air register so designed as to impart a whirling motion to the entering air. The rate of combustion is controlled by the temperature and pressure of the oil. The size of orifice in the burner tip also determines the rating, but the burner tips can be obtained in various sizes and are interchangeable, the larger size having a normal capacity of about 14,000 lb. oil per hour at 200 lb. pressure. (*Electrical World*, vol. 76, no. 15, Oct. 9, 1920, pp. 730–732, 3 figs., *de*)

HYDRAULICS

Remarkable Drop in Output of Centrifugal Pumps after Starting, J. C. Dijxhoorn. Observations made by the author indicate that many centrifugal pumps show a gradual falling off in efficiency after running for some time. Two characteristic cases are cited in connection with the large pumps used for pumping the Haarlem mere. In the first the output fell to 30 per cent below the normal, and in the second case a marked increase in the energy consumption was noticeable shortly after the pump was started. On stopping and starting the pump, the normal output and energy consumption were again obtained; but the conditions gradually fell back to those previously discovered. After discussing the influence of a possible accumulation of gas (from a peaty soil) in the suction pipe, the author rejects this explanation as being insufficient. He ascribes the cause to the fact that turbine pumps of the Francis type are designed on the assumption that the inflowing water is moving in an axial and not a rotary direction. This assumption is undoubtedly correct during starting, but it can be readily demonstrated that very little would be required to impart a rotary movement to the incoming water column, i.e., the mass of water would move in a spiral through the pipe. This rotary effect would explain the phenomenon and also the fact that in turbine pumps with a high circumferential speed, and where little or no rotary motion would be imparted to the incoming column of water, this falling-off in output disappears. The author is of opinion that the transmission of this rotary motion from the rotor of the pump back along the incoming water column is considerably accelerated by the presence of large quantities of suspended matter in the water. The obvious solution of the difficulty for low-speed turbine pumps would be the introduction of a rib or ribs in the suction pipe, to prevent a rotary motion from being imparted to the incoming water column. (*De Ingenieur*. Compare *Mechanical World*, vol. 68, no. 1760, Sept. 24, 1920, p. 216, *e*)

METALLURGY (See also Engineering Materials)

Cleaning of Blast-Furnace Gas. Description of the Lodge electrostatic process for rough cleaning of blast-furnace gas as used at the Skinningrove Works in England.

The cleaning is applied to gas used in stoves, boilers and other combustion processes. Wet cleaning has the advantage in that,

first, the sensible heat in the gas is lost; and further, power has to be expended in pumping the large volumes of water required for the dust removal. The Lodge plant has been installed to take care of this gas, 0.3 gram of dust per cubic meter in the cleaned gas having been fixed as an arbitrary standard. Essentially the method of operation of the Lodge system does not appear to differ very much from the Cottrell system which has been used in this country for a number of years. The plant appears to be working in a satisfactory manner and not only saves the trouble due to uncleaned stoves and boilers, but also has saved gas, which may have something to do with the former. Furthermore, about 50 tons of dust per week is recovered with 27 per cent content of potash. (Paper before The Iron and Steel Institute, Cardiff meeting, Sept. 1920, abstracted through *Iron Age*, vol. 106, no. 15, Oct. 7, 1920, pp. 928-930, *d*)

MILITARY ENGINEERING

Battleships, Submarine and Aircraft in Naval Warfare

The Design of War Vessels as Affected by the World War. Rear-Admiral David Watson Taylor. It is not fully possible as yet to answer the question, "What has been the effect of the World War on warship design?" and the opinion of the service has not yet been crystallized and become definite in this respect.

From such data as are available some facts may, however, be considered as established—one of them being the ability of large, modern, heavy-armored ships not only to survive but to continue in action after the most severe punishment.

Taking the battle of Jutland as a test of the defensive qualities of modern ships, one finds that in the entire action only four such ships, all of them of the battle-cruiser type, were lost as a result of the action. The four outstanding facts of interest to the designer, as they emerge in the author's analysis from the smoke and flame of the battle, are—first, the value of armor protection; second, the necessity for the maximum number of major-caliber guns; third, the tactical value of speed; and fourth, the futility of subjecting all the ships to the attack of modern weapons.

Protection of ships is being recognized as one of the most important problems and both the British and American naval services have solved this problem so far as the torpedo has been developed to date. Moreover, although the solutions differ radically in detail, they do not differ much in underlying ideas.

Of the general phases of the war the submarine campaign is given considerable attention. Nations must in the future be prepared to find the submarine playing an important part in attacking and throttling enemy commerce, even on their own coasts. The proposal brought forward at the Peace Conference to abolish the submarine entirely by international agreement was not adopted, wisely as the author thinks, for so long as the possibility of war remains, progress of science and engineering and their application to the art of war cannot successfully be throttled unless there is complete unanimity of sentiment throughout the civilized world.

War experience developed certain facts regarding the submarine. It is essentially an instrument of stealth. Once detected it is at the mercy of a surface vessel, and detection devices, while not perfect yet, have been and will be steadily improved as time goes on. If we had today an accurate device which would locate a submerged submarine with reasonable approximation several miles off and with accuracy when 100 to 200 ft. directly under the surface vessel, the submarine would be obsolete as a weapon of war.

The position of the destroyer as an element of the fighting navy has been particularly enhanced as a result of the war experience, both to attack the enemy and protect its own capital ships. As regards the design of destroyers, the principal demand has been for greater cruising radius and increased shelter and comfort for the personnel.

The rôle played by trawlers, drifters and other small vessels of a similar type has been changed somewhat from that intended at the beginning of the war. Primarily they were to be used as mine sweepers and tenders, but the development of the depth charge made it possible to employ them against submarines, which, in fact, became the principal use to which these small boats were put during the last year and a half of the war. In fact, as time went on, special boats of small sizes were developed for this kind of service, such as the British patrol boats and the United States eagle boats.

Aircraft carriers are particularly mentioned as a new and large type of naval vessel. The actual offensive use of aircraft against naval vessels was little developed during the war.

The author believes that developments in the air will be both along lines of offense against capital ships and of defense of them by auxiliary and offensive aircraft. He states, however, that the big ship which must be protected from projectiles of a ton weight falling at an angle of 30 deg. and fired from ships almost out of sight below the horizon, is not yet in serious danger from bombs carried by present-day aircraft, with chances of hitting small indeed. It seems probable that aircraft will sooner become dangerous to destroyers and light vessels, generally, than to the large ships of the line and even then in order to perform efficiently their functions with the field aircraft must have means for being carried with the fleet, not only on long cruises but actually in battle, which accounts for the development of the aircraft-carrier type of ship.

To sum up, the experience of war, so far as it can be grasped to date, has resulted in demands of every existing type of war vessel which can only be met by increased size and cost. It has resulted in the introduction of only one new type of major importance, namely, the aircraft carrier, but it has introduced a number of small types which will probably survive but need not be constructed in large quantities in time of peace.

While the present tendency is towards increased size and cost, this very fact, under the present financial economical and political conditions in the world, may actually result in the long run in the disappearance from future building programs of these very types, and the substitution for them of smaller and cheaper units made possible by new developments in size and engineering. (*Journal of the Franklin Institute*, vol. 190, no. 2, Aug. 1920, pp. 157-185, illustrated, *gA*)

POWER-PLANT ENGINEERING

Soil Vibration Due to Running Machinery and Methods of Damping It

Transmission to a Distance of Ground Vibrations Due to Machinery with Reciprocating Masses. Gerb. Discussion of the transmission of ground vibrations due to reciprocating machinery, in which it is found that such transmission to a distance takes place only through plastic subsoil. The vibrations propagate in the form of surface waves. Recommendations are made as to means of avoiding such phenomena.

At the end of 1914 in the Royal Munitions Factory in Danzig a horizontal tandem steam engine of 650 to 850 hp. was installed and when it began to run it set into vibration a number of houses in the neighborhood, some of which were located as far away as 300 m. (say, 1000 ft.). The engine foundation itself was soon split by a horizontal crack in such a manner that the upper and lower parts moved with respect to each other when the engine was running. The free mass forces of the engine in the horizontal and vertical directions amounted to about 10,000 kg. (say, 22,000 lb.) and observation in the houses affected by vibration indicated that the vibrations corresponded to an engine speed of between 160 and 180 r.p.m.

Careful measurements have further indicated that the direction of vibration of the masses did not at all coincide, as might have been expected, with the direction of the reciprocating masses in the engine and that rather the masses vibrated regularly in the direction of the axis of the minimum moment of inertia of the house foundation, hence, at times, normally to the direction of motion of the reciprocating masses of the engine.

The vibrations were of maximum value in the upper floors of the houses but did not grow in proportion to the distance from the ground. An interesting feature lies in the fact that the vibration phenomena were limited to the houses themselves, and the apparatus used for their discovery had not shown any on the ground proper, even in the immediate proximity of the engine. Likewise, it has not proved possible to establish any law for the variation of

the accelerations with the distance from the source of vibration.

Only horizontal accelerations were established in the houses, and no measurements of vertical vibrations have been made.

Because of the fact that no vertical accelerations in the houses had been discovered it was assumed that the horizontal accelerations had been transmitted by the plastic stratum of the ground and it has been proposed to isolate the vibrating machine from the surrounding structures by means of a ditch. This means has, however, proved ineffective here, as it did in some other cases, because it is not the solid surface layer of the ground but the plastic subsoil that transmits the vibrations, and this being the case, the only way to prevent the transmission of vibrations is to obviate their transmission from the source to a plastic subsoil body. This cannot be done by insulating layers at the foundation, as materials used for such insulating layers, such as felt, cork, etc., are perfectly capable of taking up vibrations of the higher frequencies propagated as noises, but are not elastic enough as compared with the elastic subsoil and cannot take up elastically horizontal acting forces.

The only truly reliable method of procedure is to attack the evil at the source and to eliminate the generation of vibration by a proper balancing of the reciprocating masses. This can be done in the engine itself only if it has not less than six cylinders. It is,

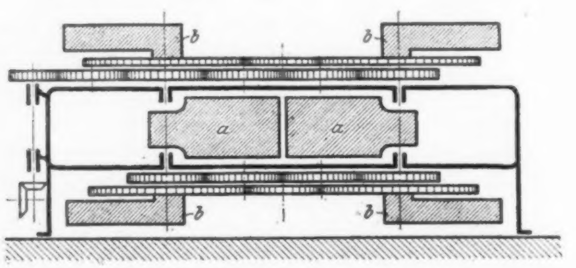

Fig. 1 Device for Balancing Reciprocating Forces in Horizontal Engines of Less Than Six Cylinders

however, possible to do this by special appliances even in a single-cylinder engine. This is based on the fact that horizontally acting free masses in crankshaft drives produce vibrations of the same frequency as the rotative speed of the engine, and, in addition to this, that higher vibrations have a double frequency. As shown in Fig. 1, the basic frequency can be ironed out by two balancing masses *a*, rotating at the same speed as the engine but in an opposite direction, which eliminates the component of centrifugal force acting at right angles to the direction of motion of the reciprocating masses. For the same reason and also in order to prevent the appearance of moments, the weight which balances out the vibrations of double frequency is divided into four parts *b* rotating at a speed double that of the engine. In this way the diagram of the centrifugal forces developed coincides at all rotative speeds with the diagram of the free horizontal forces in the engine. Since, however, the direction of the former is opposite to the direction of the latter and occurs in the same space in which the free forces of the engine operate, theoretically no forces or moments can be transmitted to the foundation. The device shown is driven from the camshaft and consumes a very small amount of power as it has only to overcome the comparatively slight friction in the ball bearings and gears. It is, however, necessary that the connection with the engine body should be strong enough to withstand the stresses produced. (*Zeitschrift des Vereines deutscher Ingenieure*, vol. 64, no. 38, Sept. 18, 1920, pp. 759–760, 2 figs., *dp*)

Device for Cutting Off Last Expansion Stage of Turbine from the Exhaust Main

Low-Pressure Steam Control Device, J. W. Smith. In a mixed-pressure steam-turbine and electric-generator installation placed in the power station of an English factory there was no provision made for automatically cutting off the last expansion stage of the turbine from the exhaust main when the supply of exhaust steam failed.

When the air supply of this steam fell below the quantity which could be passed by the low-pressure starting valve a partial vacuum was induced in the exhaust main, which, in this case, is about 400 yd. long, with the inevitable result that air was drawn in through some leaky joint or open drain cock. The starting valve could be regulated by hand to pass only the proper quantity of exhaust steam, but such a solution of the problem was troublesome and would mean that one man's whole time would be occupied. Instead it was solved by putting in an automatically operative controller.

First, there is a low-pressure receiver which diminishes the fluctuations in pressure of the exhaust steam from steam-driven machinery, such as steam hammers and non-condensing steam pumps. After leaving the receiver (Fig. 2) the exhaust steam enters the low-pressure chest through pipe *C*, then passing downward through the starting valve and upward through the emergency stop valve and the governor throttle valve into the turbine.

The turbine steam chest is fitted here with an emergency trip-stop valve *A* which closes upward and the spindle passes vertically through the bottom governor. This valve is of a piston type and is a duplicate of the governor throttle valve *B* fitted immediately above it. As arranged by the makers it was connected to its opening lever by a pair of short links *C*. These links were replaced by some longer ones with a distance piece riveted between their ends to form a flat surface *D*, and the bottom holes of the new links were elongated to allow the valve to be closed without raising the original operating lever. Under this against the wall of the condenser pit, was fitted a lever about 4 ft. 6 in. long. At about 3 in. from its fulcrum a vertical rod was jointed which passed through a suitable guide so that its end was just clear of the flat bottom of the new valve links when the new lever was at the bottom of its travel. The end of the lever had to be raised about 12 in. to close the valve, and suitable guides and stops were provided to prevent all undue stresses. Owing to the 18-to-1 leverage provided, the effect of the friction of the valve and spindle was negligible at the end of the lever. The steam receiver *E*, the shell of an old Lancashire boiler, has a siphon drain *F* connected to one end plate about 3 in. above the bottom of the shell. In consequence of the position of this drain there was always a quantity

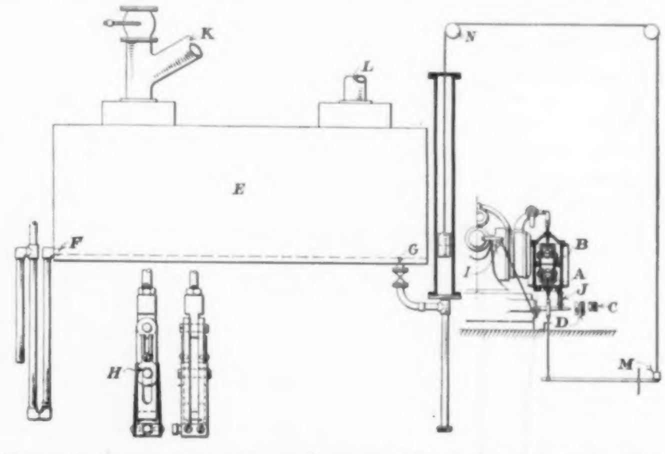

Fig. 2 Diagram of Controller Used on a Mixed-Pressure Steam Turbine at the Gloucester Wagon Company's Central Power Station

of water lying in the bottom of the shell, the surface of which measured roughly 3 ft. by 20 ft. At the other end of the steam receiver the old blow-off cock fitting *G* on the bottom of the shell had been blanked off. A $2^1/_2$-in. cock was fitted to this blow-off cock branch one week end, and, working back from that the following week, an old 7-ft. length of 8-in. cast iron pipe was rigged up in a vertical position and supported from the floor by a length of $2^1/_2$-in. pipe with a blank flange at the bottom. This pipe formed an excellent float chamber with sufficient head of water to seal the maximum pressure permissible in the receiver. Owing to the wide ratio between the surface of the water exposed to the steam on one leg of the submerged bend, and the surface of the water exposed to atmospheric pressure on the other leg of the submerged bend, about 60 sq. ft. to 50 sq. in., the rise of water in the float chamber was almost 2.3 ft. per lb. pressure in the receiver. A galvanized-iron float was provided, 6 in. diam. by 12 in. deep, with

a stretcher bar across its open top to enable it to be suspended correctly. This was filled with water and connected to the new lever by a flexible steel wire rope passing over two guide pulleys. Sufficient weight was then added to the lever to cause the float to be normally half submerged when the lever was clear of both stops.

It was found in tests that the displacement of only 2 in. of water above or below the center of the float is sufficient to operate the valve and that only a $^1/_2$-lb. variation of steam pressure is required to move the valve from "open" to "shut," or vice versa. Moreover, it is also stated that the device has been in constant use for eight years without any repairs. (Paper read before the Gloucestershire Engineering Society, abstracted through *Power House*, vol. 13, no. 19, Oct. 5, 1920, pp. 437–439, 2 figs., *d*)

Water-Indicating Devices for Locomotives

Government Tests of Water-Indicating Devices. For the purpose of determining, if possible, the general outline of the flow of water existing at the back head, when high evaporation was taking place, tests were made on one of the U. S. Railroad Administration standardized 2–10–2-type locomotives.

In these tests it was found that the way the top connection to the water column is made affects very materially the general outline assumed by the water on the back head. It also appeared that under certain conditions dry steam was being obtained both at the back knuckle and further ahead, which is believed, however, to be partly due to the exceedingly good water used in this test.

Further tests were made to determine the approximate outline and proportions of the water conditions existing at the back boiler head while the locomotive is being operated with heavy throttle, or when steam is being rapidly generated and simultaneously escaping from the boiler. These tests covered the distance of 808 miles in bad-water districts on approximately level track with a

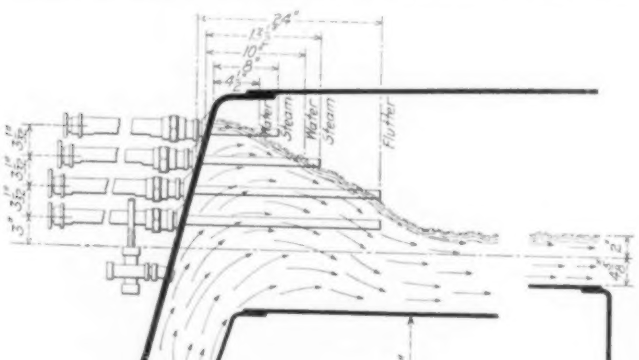

Fig. 3 Exploration Tubes Used as Water-Indicating Devices in Tests of Water Circulation in Locomotives

locomotive of the heavy 2–8–2-type equipped with superheater and duplex stoker.

The test appliances are shown in Fig. 3, the apparatus consisting of four gage cocks applied directly in the back head near the knuckle; one water column to which three gage cocks and one water glass were attached; one water glass with a 9-in. reading, standard application, with both top and bottom cocks entering boiler back head direct; one water glass applied for experimental purposes with a bottom cock entering the boiler head on back knuckle and one entering 13 in. ahead of the back knuckle, together with four exploration tubes or sliding gage cocks. Fig. 3 shows a side elevation of these exploration tubes.

Here it was found that while generally the same conditions prevail as in other tests, the outline of water reached a higher elevation and greater proportions at the back head than in the previous tests, which is due probably to the poor water used here.

Tests were also made on a switching locomotive in which, in addition to the usual apparatus, a glass tube was inserted in the top of the wrapper sheet which permitted the use of an electric light inside the boiler, clearly illuminating the steam space over the crown sheets. Five bull's-eye sight glasses were distributed so that the action of water in the back head could be seen while under steam pressure, as shown in Fig. 4.

Both main rods were disconnected, crossheads blocked at end of stroke and valve stems disconnected and so placed that steam was discharged through the exhaust nozzle and stack, creating a forced draft on the fire, representing as nearly operating conditions as possible.

When the throttle was closed and no steam escaping from the boiler the surface of the water was approximately level, with a distinct circulation noted from back to front and from the sides toward the center of the crown sheet. When the safety valves lifted, the water rose with fountain effect, around the edges of the firebox, from 1 in. to 2 in., and the circulation was materially increased.

When the throttle was opened and steam was being generated and escaping from the boiler in greater volume, the level of water

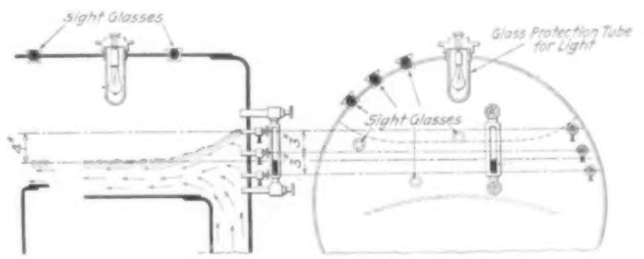

Fig. 4 Arrangement of Lights and Observation Glasses in Boiler to Determine Water Conditions

throughout the boiler was seen to rise 1 in. to $1^1/_2$ in., which rise was registered by the water glass, and a marked flow of water, with fountain effect, was observed rising around the firebox at the back head and wrapper sheets, reaching a height above that over the remaining portion of the crown sheet of approximately 2 in. to 4 in., in proportion to the amount of steam being generated and simultaneously escaping from the boiler.

The important feature to be noted is that this height of water, as seen at the back head, was approximately 4 in. at its maximum, and was registered by the gage cocks, while at the same time it could be seen that the water glass was registering the level further ahead over the crown sheet.

Among the interesting features observed were the size of the steam bubbles which were approximately $^1/_4$ in. to $^3/_8$ in. in diameter, and the rapidity with which they were seen to rise to the surface and explode. The size and number of these steam bubbles, which were seen rapidly rising next to the back head, explain one of the physical reasons for the increased height of water around the crown sheet and the rapid circulation attained.

These observations establish beyond question that when steam is being generated and escaping there is an upward movement of water at the back head of the locomotive boiler which carries it above that further ahead over the crown sheet, and that the gage cocks, when applied directly in the boiler, register this rise of water and do not indicate the level further ahead, while the water glass registers the level of water further ahead and not the fountain of water at the back head.

Among the general observations made attention may be called to the following: It is recognized that the volume of water in the boiler increases in proportion to the amount of steam being generated and in the same ratio that the steam bubbles below the surface are formed and expanded, the volume of which depends to a very considerable extent upon the purity of the water in the boiler its ability to readily release the steam being generated, consequently increasing the height of water in the same proportion, which height is registered by the water glass.

Gage cocks secured directly in the boiler have been shown to be incapable of correctly indicating the general water level and an arrangement is described and illustrated in the report which is claimed to be more correct and safe than the ordinary methods. (Report of the Bureau of Locomotive Inspection of the Interstate Commerce Commission, abstracted through *Railway Me-*

chanical Engineer, vol. 94, no. 10, Oct. 1920, pp. 630–633. This is the second part of the report, the first part having been given in the *Railway Mechanical Engineer*, for Sept. 1920. *dep*)

POWER TRANSMISSION

Liquid Variable-Speed Transmission Gear

Carey Oil Transmission System. Description of the pump used for an oil transmission system. The rotor (Fig. 5) consists of a solid block of steel *R* in which five recesses are formed to act as cylinders. Each recess is fitted with a glass-hard steel bush in which works an ordinary steel ball acting as a piston and having a total clearance of about one one-thousandth of an inch. These ball pistons were in conjunction with a track *T* of glass-hard steel, the track being carried by a cast-steel ring *S* which works between

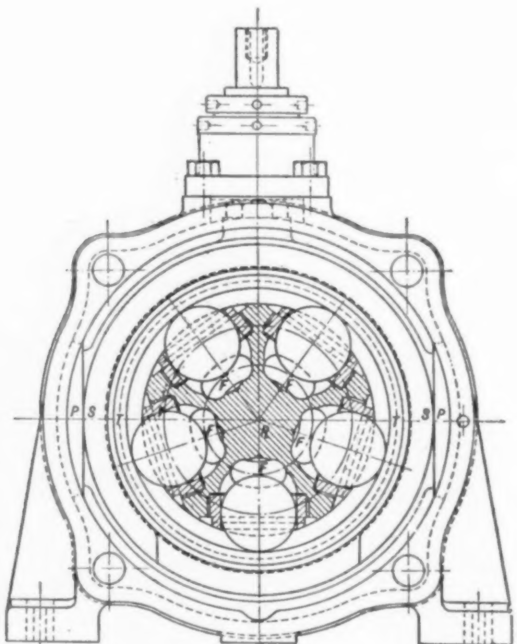

Fig. 5 Cross-Section of Rotor of the Carey Pump

guides *P* formed in the cast-iron main casing or pump body. This ring may be moved to different positions in a vertical direction between the guides so that varying degrees of eccentricity may be obtained between the center of the track and the axis of the rotor, either above or below the center line. When the centers of both parts coincide, no relative radial motion takes place between the rotor and the ball pistons. As the degree of eccentricity is increased the quantity of oil delivered by the pump increases likewise until the limit of travel is reached. When the track engine is raised above the center, flow takes place in one direction and this direction is reversed when the track is moved to a position below the center line.

In each of the five cylinder recesses there is a port *F* with a hardened base and a floating valve (not shown in the drawing) having a rocking motion and also a rotating motion so that it can adjust itself to the position of the rotor. This valve carries the inlet and outlet ports.

By combining two machines of this type it is possible to make a variable-speed transmission gear. One machine is driven by a prime mover at constant speed and acting as a variable-stroke pump delivers oil under pressure to the other machine which acts as a hydraulic motor. This can be done by coupling up two Carey machines back to back, but with their respective back covers replaced by a single junction casing which carries the two floating valves and provides the necessary passages for the flow and return of the working fluid. The ratio of speeds between the driving pump and the driven pump is controlled by the lengths of the strokes of the two machines.

It has been found that for speeds up to 500 r.p.m. these transmission gears may be filled with oil, but for higher speeds it is desirable that the rotor should run in air. (*The Engineer*, vol. 130, no. 3377, Sept. 17, 1920, p. 284, 2 figs., *d*)

PRESSES

An Adjustable-Position Press. Description of a press designed and built by the Toledo Machine and Tool Company, Toledo, Ohio, the most interesting feature of which is, that it is operative in either an upright or an inclined position, a turn of the handwheel permitting a change in position. The press is driven by a direct-connected electric motor so arranged that it stays vertical no matter whether the press is in the vertical or inclined position. (*The Iron Trade Review*, vol. 67, no. 17, Oct. 21, 1920, p. 1140, 2 figs., *d*)

RAILWAY ENGINEERING (See also Power-Plant Engineering)

Regan Automatic Train Control System. This system, as installed on the Great Eastern Railway where the Westinghouse brake is employed, consists of a shoe suspended from the center of the rear buffer pin of the engine, an electropneumatic valve behind the steps on the right side, a relay box and release switch on the same side, a battery box and a speed-control device on the right wheel of the controlling nozzle. The equipment on the track consists of a ramp 100 ft. long with inclined ends fixed in the "four-foot" at each signal and electrically connected thereto.

The speed-control device consists of a centrifugal governor mounted upon a baseplate rigidly bolted to the end of the trailing nozzle and accurately centered therewith.

The shoe mechanism consists of a shoe stem, a cylinder and a circuit controller. The upper part of the steam connects to the brake pipe, and as the stem is hollow, it follows that should the shoe be broken off the air would escape and the brake would be automatically applied.

A demonstration of this system was given on the Great Eastern Railway on September 30, 1920, when the speed control was set for 24 miles per hour and the train was stopped from that speed in 225 ft.

In this connection, it may be stated that in an editorial in same issue of *The Engineer* (p. 355–356) automatic train control is advocated for Great Britain and instances are cited of serious accidents which could have been prevented had such a control been available. In fact, it is stated that the Ministry of Transport has appointed a Departmental Committee to consider the whole question.

In discussing the matters to be considered by this new Committee the editorial points out as one having a very serious aspect, the question whether or not the uniform system for the whole of Great Britain should be determined upon. This is particularly important as British locomotives do a considerable amount of running over "foreign" tracks. There is also the question as to what object automatic train control has to achieve; this is, whether or not the driver should have an indication of the state of the running signal which he is unable to see, for example, during fog or falling snow.

An interesting discussion is presented as to the conditions which the track equipment should satisfy. The subject of speed control is also not as simple as it looks, as, for example, it is not easy to insure that a mixed-traffic engine just taken off a fast freight train is properly adjusted for working an express passenger train, and vice versa. (*The Engineer*, vol. 130, no. 3380, Oct. 8, 1920, p. 348, *dg*)

RESEARCH

Progress of Scientific and Industrial Research in England During the Past Year

Report of the Committee of the Privy Council for Scientific and Industrial Research for the Year 1919–1920. From the report presented it would appear that a very active program for research is being steadily pushed ahead in England and that quite substantial funds are available therefor. In particu-

lar, it is pointed out that the British industries with an awakening interest in the value of research and of scientific control of manufactures, are making such demands on the available supply of research workers and offering such salaries that the universities face the danger of losing their teaching staffs in the same manner as they did during the war.

Important grants have been made to students and independent workers as well as to provide professors with research assistants of scientific standing. No conditions are attached to the grants made to workers whose sole aim is the extension of knowledge, either as to the line of their work or as to the use of the results. The only condition is that if they propose to make commercial use of their discoveries they must consult the Committee for Scientific and Industrial Research, because at this point they are leaving the field of pure investigation; otherwise, however, their tenure of the grant is perfectly free.

There are now 18 research associations of various character in England licensed by the Committee and covering many fields of industry, and five other associations have been approved but have not received their licenses.

The Department of Research is committed to a total expenditure of £450,000 on account of the established research associations and to a further expenditure of at least £120,000 on account of those approved but not yet licensed. The total committments may, however, reach £800,000.

It is claimed that the industries fully realize already the importance of research, though they have not yet quite come to a full appreciation of its difficulty or its full worth. The best proof that the value of research is realized is shown that large funds for the endowment of research are being raised privately; for example, the cotton industry is hoping to raise £250,000 for that purpose.

The report mentions more or less briefly the method of organization of research and the subjects which occupy the attention of the various boards and committees.

In this connection it is of interest to note that the question of fuel is considered to be a basic problem of the greatest national importance. As regards the Committee of Research, it is in the hands of a fuel research board. There are numerous other boards covering the vast field of investigation.

As a sample of the work of these committees may be mentioned the following quotation describing the Zirconium Inquiry Committee:

> It was frequently suggested during the war that zirconium-containing steels of remarkable hardness had been produced and were being employed by enemy countries in the production of light armor for aeroplanes and tanks. In July 1918, at the request of the Ministry of Munitions, a Zirconium Inquiry Committee was set up with the object of investigating the preparation of ferro-zirconium and, from the latter, of zirconium-containing steels. The experimental difficulties in the way of production of a true alloy of iron and zirconium were numerous and severe, and after much work they were only partly overcome. It was found possible to prepare, in 50-lb. batches, a ferro-zirconium containing, however, a considerable portion of carbon, while much of the zirconium in the material was present as carbide. It was consequently very doubtful whether the zirconium in this material could be transferred into a melt of steel. In the meantime numerous inquiries have failed to discover any source of supply of ferro-zirconium containing only small proportions of carbon and silicon, or any evidence that zirconium added to steel conveys to it any beneficial quality. Further, the examination of samples of light armor of enemy origin has not revealed the presence of zirconium.
>
> After the conclusion of the war the importance of the inquiry diminished and in consequence the Committee were of opinion that their investigations should be concluded. We have recently received their report and have recommended that it be communicated to the fighting services.

In an appendix some information is given on the developments of the organization of research in the Overseas Dominions and in the allied and associated countries.

In particular, there is under consideration the proposal for the establishment of a National Institute for Canada, on which the report of the Committee was unanimously adopted by the Canadian House of Commons in May last. The cost of building and equipping the Institute is estimated at $600,000 and approximately $50,000 is required for the salaries of the staff during the first year. The proposed Institute will exercise functions akin to those of the Bureau of Standards in Washington. It is also anticipated that the Institute will play an important part in fostering the movement for coöperative research among the industries of Canada by placing laboratories and (if necessary) staffs at the disposal of coöperative research guilds when they are not in a position to maintain laboratories of their own.

There are already several organizations in Canada established with a view to industrial research, such as, for example, the Fuel Research Board appointed to deal with the standardization of coals through the Dominion, and the Peat Commission which has already successfully developed a bog at Alfred, Ontario. (Abstract of Fifth Annual Report of the Committee of the Privy Council for Scientific and Industrial Research, presented to Parliament by Command by His Majesty and published in London in 1920, 120 pp., *g*)

SPECIAL MACHINERY (See Power Transmission)

STEAM ENGINEERING

German Tests on Steam Nozzles and Diffusors

Steam Nozzles. A German engineer, Friedrich Muller, of Berlin, has recently published certain data of an investigation dealing with tests on a steam diffuser.

Investigations dealing with the inner processes in the conversion of pressure into velocity in nozzles have not entirely cleared up the theory of steam flow; for example, no one has succeeded thus far in giving a complete expression for processes which take place under the assumption of a unidimensional flow, and Professor Stodola in an article in *Zeitschrift des Vereines deutscher Ingenieure* (1919) states that these processes will not be made clear until laws are established on a polydimensional conception of flow.

In the experiments described by Muller, carried out in the laboratory of machine design of the Technical High School, Charlottenburg, live steam of various temperatures and pressures was expanded in a DeLaval nozzle. The nozzle was attached in the usual manner to a movable arm of a reaction device. When at dead center this arm was held rigid and the steam flowed crosswise toward the exit from the nozzle of the diffuser and was then condensed on the pipes of a surface condenser. A valve was provided to make it possible to create the desired back pressure in back of the diffusor. The state of the steam previous to the entrance into the nozzle was determined by measuring the steam pressure by a manometer and likewise by measuring the respective temperatures.

In the tests the following two concepts were followed up: first the variable state of the steam with the given nozzle; and second, different nozzles with a corresponding initial state of the steam.

The data of the tests are presented in the original publication in eight tables. Among other things, this investigation led to the conclusion that we have not yet the means necessary to produce the designed expansion, but we can by proper devices make the nozzles capable of satisfying given requirements of pressure conditions. On the other hand, these tests have been sufficient to throw a great deal of light on what takes place in the diffusors. Hitherto information available was only sufficient to determine the shape of the diffusor when the given weight of steam expanded in a nozzle had to be compressed to a given back pressure. The author proposes to proceed in the opposite direction, that is, to pay no attention at first to the shape of the diffusor and instead to determine that pressure both in front and back of the diffusor which gives the best efficiency.

By efficiency of the diffusor is, therefore, understood here the ratio of two heat heads, one being the expansion of the steam in the nozzle and the other determinable by the pressures in front and in back of the diffusor. This latter heat head is to be measured on the adiabatic curve of the nozzle expansion.

The most reliable data have been obtained in the tests presented in Fig. 6. The curves *d* and *e* give the most desirable variations of pressure. According to the general theory of nozzles, the following two equations are available: first, equation of continuity:

$$W_{pr} = \frac{G \times v_{11}}{F_{m\ Diff}} \qquad [1]$$

second, equation of sound velocity:

$$W_{th} = g \times k \times p_{11} \times v_{11} \qquad [2]$$

in which the following notation is used:

W_{pr} = velocity in meters per second computed on the assumption of continuity

W_{th} = velocity of sound in meters per second
G = weight of steam flowing per second in kg.
g = 9.81 meters per sec. per sec.
k = ratio of specific heat at constant pressure to specific heat at constant volume

$$\psi = \sqrt{g \times k \times \left(\frac{2}{k+1}\right)^{(k+1)/(k-1)}}$$

p = pressure in kg. per sq. m. available at any time
v = available specific volume in cu. m. per kg.
$f_{m\ Düse}$ = minimum cross-section of the nozzle in sq. m. (*Düse* means nozzle)
$F_{m\ Diff}$ = minimum cross-section of the diffusor in sq. m.

If we insert the experimental values as given in Fig. 6 into Equations [1] and [2], we find that the variation of pressure is free from

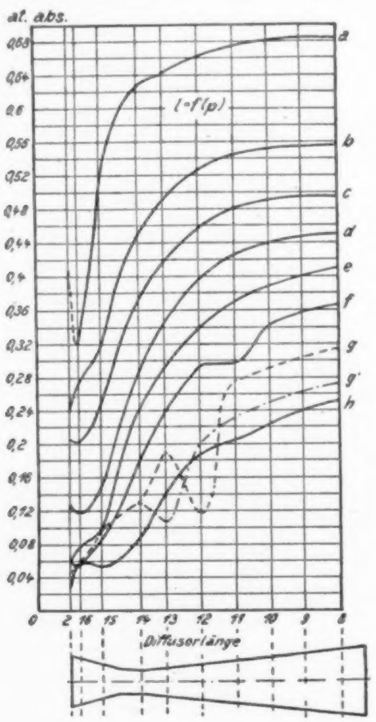

FIG. 6 CURVES OBTAINED IN TESTS ON A STEAM DIFFUSOR AT THE MACHINE CONSTRUCTION LABORATORY OF THE TECHNICAL HIGH SCHOOL IN CHARLOTTENBURG

(*at. abs.*, atmospheres absolute; *Diffusorlänge*, length of diffusor.)

shocks and the diffusor develops its best efficiency when it is assumed that

$$\frac{W_{th}}{W_{pr}} = 1 \ldots\ldots\ldots\ldots [3]$$

Since the maximum, as has been found elsewhere, occurs with a back pressure of about 0.435 atmos. abs., it follows that

$$\frac{Gv_{14}}{F_{m\ Diff}} = \sqrt{g \times k \times p_{14} \times v_{14}} \ldots\ldots\ldots\ldots [3a]$$

which when simplified reduces to

$$\left(\frac{G}{F_{m\ Diff}}\right)^2 = (g \times k) - \frac{p_{14}}{v_{14}} \ldots\ldots\ldots\ldots [4]$$

Equation [4] becomes similar to the general nozzle equation

$$G = F_{m\ Düse} \times \psi \sqrt{\frac{p^1}{v^1}} \ldots\ldots\ldots\ldots [4a]$$

the latter is expressed in the form

$$\left(\frac{G}{F_{m\ Düse}}\right)^2 = (g \times k)\frac{p_m}{v_m} \ldots\ldots\ldots\ldots [5]$$

By combining Equations [1] and [2] the conclusion may be arrived at that a definite ratio of pressures may characterize a diffusor just as it does nozzles. It is further found that most likely when the flow in a diffusor is free from shocks, there is a very definite value determining the ratio between pressure in the smallest cross-section p_{14} to end pressure p_8. The tests have shown that this ratio for the given turbine was equal to $p_{14}/p_8 = 0.6$. The author expressed it, however, in another form, namely,

$$\frac{p_{14}}{p_8} = \left(\frac{2}{k+1}\right)^{k/(k-1)} \ldots\ldots\ldots\ldots [6]$$

where k, in the case of diffusors, has the usual values for saturated steam. Substituting this in Equation [3a] or its derivative, he gets

$$G = F_{m\ Diff} \times \psi \times \sqrt{\frac{p_8}{v_8}} \ldots\ldots\ldots\ldots [6a]$$

Furthermore, as the weight of the steam flowing per unit of time is the same for the nozzle and the diffusor and assuming that $\psi_{Düse}$ for the nozzle is equal to ψ_{Diff} for the diffusor, it appears that the following relation holds good for the ratio between the minimum cross-section to the minimum cross-section to the diffusor.

$$\frac{F_{m\ Diff}}{F_{m\ Düse}} = \frac{\sqrt{\frac{p_1}{v_1}}}{\sqrt{\frac{p_8}{v_8}}} \ldots\ldots\ldots\ldots [7]$$

Moreover, this equation was proved to be approximately correct experimentally and the following values have been found to hold good:

$F_{m\ Düse}$ = 5.11 sq. cm.
p_1 = 3 atmos. abs.
v_1 = 0.911 cu. m. per kg.
$D_{m\ Diff}$ = 30.2 sq. cm.
p_8 = 0.41 atmos. abs.
v_8 = 5 cu. m. per kg.
$F_{m\ Diff}/F_{m\ Düse}$ = 1.82/0.287.

Fig. 6 among other things, explains the pressure variations, since with an excessively large ratio of pressures the steam finds in the convergent and divergent parts of the nozzle somewhere cross-sections where oscillations of pressure occur. If, however, the pressure ratio is below the theoretically correct one, then the minimum cross-section must be smaller than that actually available and because of this the steam does not lie at the walls but forms a diffusor of its own. (Mitteilungen des Maschinenbau-Laboratoriums in Berlin, abstracted through *Der Praktische Maschinen-Konstrukteur*, vol. 53, no. 31, Aug. 5, 1920, pp. 280–282, 1 fig., *et*)

TESTING MATERIALS

NEW MAGNETIC TESTING APPARATUS. Description of a new device for the magnetic testing of steel which its inventor, Dr. Charles W. Burrows (Mem.Am.Soc.M.E.), calls the defectoscope.

The big advantage of magnetic testing is, first, that it can be applied to the article in its finished form; and second, that it in no way affects the article or mars it.

When a test is made by means of magnetic defectoscope the bar must first be magnetized. This is effected by means of a relatively short solenoid energized by a direct current of such value that the magnetism is carried well beyond the knee of the induction curve. Next, a detector is used to discover magnetic variations of the bar. This detector consists of two test coils having the same number of turns and surrounding the specimen. Detection is made by shifting the detector from one position to another along the length of the test material, and as it occupies different positions it is threaded by an induction which depends upon the nature of the specimen. If the specimen is not quite uniform the magnetic induction threading one of the coils and the detector is different from the magnetic induction threading the other coil. The result is that the electromotive force generated in one of the test coils is different from that generated in the second test coil and this differential electromotive force indicates lack of homogeneity in the specimen and can be read from the indicator, in this case a heavily damped short-period D'Arsonval galvanometer provided with a recorder which is essentially a photographic film caused to move uniformly across a small slit through whose opening a spot of light is reflected by the galvanometer. The instrument is, of course, provided with the control box containing the necessary electrical switches, rheostats, and instruments.

In the original article it is shown how the defectoscope may be applied to the examination of rails, rods, wire, cable, etc. Among

other things, the instrument may be readily applied to the examination of strip material such as is used in the manufacture of various saws and coil springs.

It would appear that for the examination of material which possesses circular symmetry, test methods have to be applied somewhat different from those used for rectilinear material. In fact, small circular objects have a special method of their own for magnetic examination, namely, examination in a rotating magnetic field and measurement of the magnetic torque exerted on the specimen by the rotating magnetic field, so that it is really not the permeability but rather the magnetic hysteresis of the material that is measured. (*Iron Age*, vol. 106, no. 18 Oct. 28, 1920, pp 1125–1128, 7 figs., *d*)

TRANSPORTATION

Motor Transportation of Steel Products

TRUCK TRANSPORTATION IN THE STEEL INDUSTRY. Myers L. Feiser. More steel is said to have been moved by motor truck during the past several months than ever before in this country, due to the demoralized traffic conditions which reached an acute stage last April as a result of the outlaw railroad strike. Steel recently carried in motor trucks from mill to consumer or to cars for shipment to consumer is estimated at more than 100,000 tons monthly, although no reliable records are available to cover the entire industry. Some makers, have, however, tabulated their truck tonnages, and one in the Pittsburgh district reports 25,000 tons in a single month and an average close to this figure for some time.

In normal times distance has been one of the factors limiting the use of trucks in steel hauling, but in the past few months unusually long hauls have been resorted to. One user of sheets in New England, for example, sent a truck all the way to Pittsburgh for sheet bars. Another buyer of sheets sent his truck from Philadelphia to Niles, Ohio, for a quantity of black sheets. These distances are exceptional, however, and most of the trucking of steel recently has been on an average of perhaps 50 miles.

The main sizes of trucks used for steel carrying have been 5-ton and 3-ton. The costs varied widely, but the demand for steel has been such as to make the cost in some cases a minor factor.

The organization of trucking with the various companies has been different, few, if any, steel makers maintaining a trucking service of their own for their customers, though some, as, for example, the Republic Iron and Steel Company, Youngstown, Ohio, have trucks for their own requirements.

Motor-truck transportation apparently appealed particularly to consumers of high-grade steels, which steels are not necessarily required in large quantities, especially that regular motor routes have been established between cities with scheduled stops at plants and towns on the way. It has been found that the charges over these routes vary, but when material is urgently required the extra cost represents a premium which the consumer is willing to pay in order to obtain delivery.

A canvass of steel manufacturers has shown that the increase in the movement of material by truck is held up by the condition of roads, and that otherwise with proper equipment, truck transportation of steel and iron products especially for short distances has apparently a promising future. It would appear, however, that under normal conditions the question of cost will have a decided influence. (*The Iron Trade Review*, vol. 67, no. 17, Oct. 21, 1920, pp. 1127–1129, 5 figs., *dg*)

CLASSIFICATION OF ARTICLES

Articles appearing in the Survey are classified as *c* comparative; *d* descriptive; *e* experimental; *g* general; *h* historical; *m* mathematical; *p* practical; *s* statistical; *t* theoretical. Articles of especial merit are rated *A* by the reviewer. Opinions expressed are those of the reviewer, not of the Society. The Editor will be pleased to receive inquiries for further information in connection with articles reported in the Survey.

FOUNDATIONS FOR MACHINERY

(*Continued from page 672*)

to bring the system to rest. It is still more important, however, to note the fact that we introduced the additional degree of freedom precisely in the sense of action of the disturbing agency, that is, in the sense of the plane of the figure and not at right angles thereto; or, say, in an up-and-down sense, as for instance by providing a coil spring instead of joint *H*.

THE BASIS OF FOUNDATION DESIGN

This, then, will be taken as basis for our further discussion: In contemplating the design of a foundation we shall always separate those directions (or axes of instantaneous rotation) about which the system cannot (or at least is not likely to) oscillate from those directions (or instantaneous axes) about which the system is more or less certain to vibrate. We next shall select a "steady" point from purely practical considerations, and finally devise such means of controlling the "free periods" of the system as will secure the desired degree of remoteness from synchronism under the actual operative

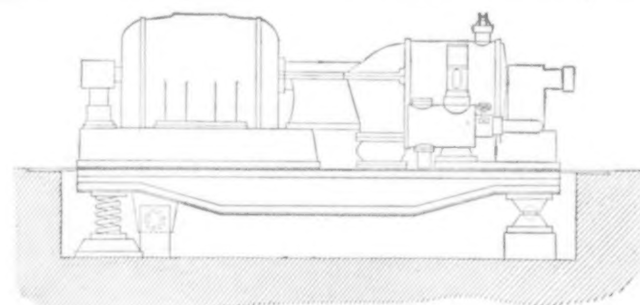

FIG. 3 APPLICATION OF AUTHOR'S DESIGN TO A TURBO-GENERATOR

speed. Such means of course will be springs, exceedingly heavy, and not in the least calculated to allow of any free wabbling of the system. They will also be adjustable so that the desired periods may be readily varied within wide limits; and in general structurally arranged to introduce as few changes as possible.

The author feels that to submit too many particulars as regards the detailed designs of such an arrangement would certainly defeat the purpose of this paper. Considering, therefore, only one type of apparatus, a turbo-generator (Fig. 3), we must start out with the selection of the steady point. We will naturally place it as near the steam main as possible (not to the exclusion, of course, of a suitable expansion joint), as under all conditions, should there be a choice of position, preference should be given to that point as far as possible from the center of gravity of the system, so that any static unbalance (whipping, etc.), would be made to act not as a force *upon*, but as a moment *about*, that steady point. Such point should actually be made as steady as possible and no trouble should be spared in providing suitable piling or digging down to the solid ground and constructing suitable footings.

The next problem is to design a substructure adapted to receive the bedplate of the apparatus and made stiff enough so as to eliminate any "periods" of its own. This bedplate may be made of structural steel or of reinforced concrete, in which latter case the ends thereof may be made of cast iron. The substructure is supported upon the steady point either by a ball-and-socket arrangement, or is simply bolted at that point to the floor plate underneath by a bolt which need not necessarily be very light but which must be arranged in a manner to secure the minimum area of actual contact. Remembering that in apparatus of this sort the tendency to oscillate about the axis x (Fig. 1) is always rather negligible, we have practically only two degrees of freedom and only two periods to adjust so as to have them well out of the limits of the operative speed. Hence the two sets of springs, one to take care of the period corresponding to oscillation in the vertical plane, the other to control motion in the horizontal plane. It should not be imagined, however, that these springs will necessarily be very light; they will always have considerable stiffness, but their function is that of being the only members that *can* yield and the whole situation is controlled by the proper choice of these yielding elements.

ENGINEERING RESEARCH

A Department Conducted by the Research Committee of the A.S.M.E.

Department of Scientific and Industrial Research

THE Fifth Annual Report of the Committee of the Privy Council for Scientific and Industrial Research has now been issued (Cmd 905) and may be obtained (price 1—by post 1/2½) through any bookseller or direct from H. M. Stationery Office at the following addresses: Imperial House, Kingsway, London, W.C. 2; 28 Abingdon Street, London, S.W. 1; 37 Peter Street, Manchester; 1 St. Andrew's Crescent, Cardiff; 23 Forth Street, Edinburgh; or from E. Ponsonby Ltd., 116 Grafton St., Dublin.

Besides a detailed account of the work of the Scientific and Industrial Research Department during the year 1919–1920, this report contains a review of the activities of the Department during the five years that have passed since the establishment of the Committee of the Privy Council for Scientific and Industrial Research statistics of the grants made and sums expended over this period and an outline of the development of coöperative association for industrial research.

Research Résumé of the Month

A—Research Results

The purpose of this section of Engineering Research is to give the origin of research information which has been completed, to give a résumé of research results with formulæ or curves where such may be readily given, and to report results of non-extensive researches which in the opinion of the investigators do not warrant a paper.

Apparatus and Instruments A15-20. Purity of Electrolytic Oxygen. An instrument built by the Leeds & Northrup Company for determining the purity of electrolytic oxygen by thermal conductivity has been calibrated at the Bureau of Standards. A number of manufacturers of chemical products intend to apply this method of manufacture for several of their processes. A 16-point gas analysis prepared for the helium plant at Fort Worth is well under way. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Apparatus and Instruments A16-20. Reflectometer. The Bureau of Standards has recently developed a reflectometer for measuring the light from walls, ceilings and other objects. Serious errors have been made in previous determinations of reflection factors of most materials. Results have been confirmed by other experimenters. The instrument will be described before the convention of the Illuminating Engineering Society during November and in a scientific paper of the Bureau of Standards. An original form of the instrument was described in Scientific Paper 391 and also in the *Journal of the Optical Society* for January, 1920. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Chemistry, General and Physical A1-20. Colloid Chemistry. The Committee of the British Association for the advancement of Science has issued its third report on Colloid Chemistry and its general and industrial applications. This has been published for the Department of Scientific and Industrial Research of Great Britain. The report includes the following sections:

1 Colloid Chemistry of Soap, Part I—Solutions. By Prof. J. W. McBain.
2 Ultramicroscopy. By G. King, M.Sc., F.I.C.
3 Solubility of Gases in Colloidal Solutions. By G. King, M.Sc., F.I.C.
4 Electrical Charge on Colloids. By J. A. Wilson.
5 Imbibition of Gels, Part I. By J. A. Wilson.

The subjects dealt with under the second head are:

6 Imbibition of Gels, Part II—Industrial Applications. By J. A. Wilson.
7 Colloid Problems in Bread Making. By R. Whymper.
8 Colloid Chemistry in Photography. By Dr. R. E. Slade.
9 Collodion in Photography. By H. W. Greenwood.
10 Cellulose Esters. By Foster Sproxton, B.Sc., F.I.C.
11 Colloid Chemistry of Petroleum. By Dr. A. E. Dunstan.
12 Asphalt. By Clifford Richardson, M.Am.Soc., C.E.F.C.S.
13 Varnishes, Paints and Pigments. By Dr. R. S. Morrell.
14 Clays and Clay Products. By A. B. Searle.

The price of the report is 2s.6d. and it may be obtained from Imperial House, Kingsway, London, W.C. 2.

The first report of the Committee issued in 1917 may be obtained from the British Association, Burlington House, London W.1., price 2s., and the second report from Imperial House, Kingsway, London W.C. 2.

Explosives and Explosions A1-20. Liquid-Oxygen Explosives in Germany. Mr. George S. Rice has made report No. 2163 to the Bureau of Mines on this subject. The report shows that 136 plants with a total capacity of 3797 liters of liquid oxygen per hour have been installed in the coal, iron, potash and salt mines, as well as for military purposes in various parts of Germany and in the French coal mines. Address F. G. Cottrell, Director, Bureau of Mines, Washington, D. C.

Foundry Equipment, Materials and Methods A1-20. Metals Alloyed with Gray-Iron Castings. Experiments have been made to determine if any benefit results by adding such metals as zirconium, aluminum and uranium to gray cast iron. Zirconium in a ferroalloy containing 35 per cent of zirconium was added to the iron in the ladle in the proportions of 2 lb. of alloy per ton of iron. The analysis showed 0.03 per cent zirconium in the castings. Cylinders and test bars were cast from this metal. Transverse tests showed an average of 3000 lb. and tensile tests, above 25,000 lb. per sq. in. These results are approximately the same as those obtained with regular run of castings. The cylinders machined more easily than those without zirconium and were much softer. The castings were close-grained and clear. The addition of ferrozirconium increased the cost about \$2 per ton. Uranium was added in the form of an aluminum alloy containing 96 per cent aluminum. Three samples were tried containing 0.21 per cent, 0.50 per cent and 1 per cent uranium. Test bars showed the same transverse strength as regular run of castings with a tensile strength slightly lower than those of the regular iron. The castings showed no better machining qualities but were close-grained and clean. The alloys may have a scavenging effect, but the value of the uranium alloys is questionable. Address H. V. Wille, Baldwin Locomotive Works, Philadelphia, Pa.

Fuels, Gas, Tar and Coke A14-20. Water and Petroleum. The Pittsburgh Petroleum Laboratory of the Bureau of Mines has recently developed an improved method for determining water in petroleum emulsions. It is a modification of the familiar procedure of distillation with immiscible solvent. It is described in Report No. 2159 by E. W. Dean and W. A. Jacobs. It is also described by E. W. Dean and V. D. Starke in the *Journal of Industrial and Engineering Chemistry*, vol. 20, May 1920, p. 486. The equipment is made up of standard parts with the exception of the distilling-tube receiver, which can be obtained through the Bureau of Mines, from certain chemical supply houses and an electric heater which may be made from an electric hot plate. Names and addresses of firms may be obtained from the Bureau on request. The method may be used with fuel oils, shale oils, tars, greases and mixtures of powdered coal, oil and water. Address F. G. Cottrell, Director, Bureau of Mines, Washington, D. C.

Glass and Ceramics A3-20. Colloidal Kaolin. The Kraus process for the treatment of kaolin is based on the colloidal theory in which colloidal gels already existent but confined or imprisoned by waters of crystallization are released and remaining constituent crystalline and amorphous bodies are partially gelatinized. The colloidal gels are predominant after treatment and there is a change in plasticity, absorption, covering capacity, bonding strength and burning density. There is much improvement in the manufacture of many products. Greater retention is shown when used as a paper filler; china ware is more translucent; paint more adhesive and of greater covering capacity; electric porcelain has higher dielectric strength; oilcloth is more flexible. Colloidal kaolin is made adaptable for new uses as in soap, glass pots, refractories and it may replace silica in steel manufacture. Address Kraus Research Laboratories, Inc., 130 Pearl St., New York.

Glass and Ceramics A4-20. Ultramicroscopic Examination of Clays. A study of clays by ultramicroscopic examination indicates that a study along the lines of colloid-chemical principles and analysis will throw much light upon many obscure phenomena met by those who use clay for ceramic and other purposes. See article by Jerome Alexander in the *Journal of the American Ceramic Society*, August 1920.

Internal-Combustion Motors A3-20. Preheating Air Fuels. A paper was presented at the June Meeting of the Society of Automotive Engineers by a member of the staff of the Bureau of Standards giving a report on the value of various systems in preheating air fuel used in automobile engines. This work is being continued to ascertain the effect of different degrees of heating. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Machine Shop A1-20. Calibration of End Standards. The Bureau of Standards is using interference methods for the calibration of end standards used as precision gages and is obtaining rapid and reliable work and increasing the production of high-precision end standards. An article on this method of calibration is being prepared for publication. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Machine Design A2–20. Shrink Fits. Experiments to determine allowance for locomotive reverse shaft arms with bearings 4 in. in diameter and 4 in. long. Ordinary shop practice allows $^1/_{64}$ in. for all sizes and styles. Steel specimens prepared in form of round disks 4 in. indiameter and 4 in. thick. Steel collars $^7/_8$ in. thick were machined with holes bored smaller than 4 in. by the following amounts: 0.004 in., 0.008 in., 0.012 in., 0.016 in., 0.020 in. These numbers vary by 0.001 in. per inch of diameter. The collars were shrunk on at a temperature of 600 deg. fahr. and in accordance with common practice, and after cooling, the sleeve was supported by a sleeve with a $4^1/_2$-in. hole, while a plug of smaller diameter than 4 in. was placed on the 4-in. disk. After this load was applied from a testing machine to determine the starting pressure and the pressure at each quarter inch. The results of the test are shown by the curve, Fig. 1. The maximum

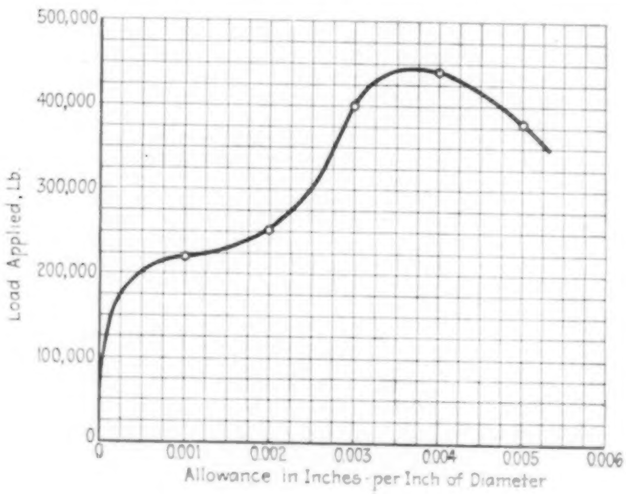

Fig. 1 Shrink Fits: Curve of Starting Pressure

strength seems to occur at about 0.00375 in. per inch of diameter. This result is about the same as that found for axles and wristpins of this size and the same allowance will be made for shrink fits of steel as had formerly been used for forced fits of steel, the latter being the result of careful tests. Address H. V. Wille, Baldwin Locomotive Works, Philadelphia, Pa.

Mining, General A5–20. Preserving Mine Timbers. The Forest Products Laboratory installed timbers treated with coal-tar creosote in an Alabama mine ten years ago. During this time all untreated timbers have been removed on account of decay, while 80 per cent of the creosoted timbers are still sound and none have decayed to an extent requiring removal. Other experiments have proved the same thing. Three preservatives are suitable for mine work: coal-tar creosote; zinc chloride, and sodium fluoride. The first of these is the most effective. The fire hazard as shown from long experience is not greatly increased by the use of creosote. Zinc chloride and sodium fluoride are odorless and tend to reduce inflammability. They are cheaper but do not give such permanent protection. Creosote is applied by brush, dipping or by pressure. Zinc chloride and sodium fluoride may be injected by steeping or by pressure. The saving will pay in every case. The wood preservative should be soluble in water if made from inorganic salts. In this way the poisonous substance is carried into the wood. In the case of creosote the poisonous material is carried in the oil. Address Director, Forest Products Laboratory, Madison, Wis.

Reflectometer A1–20. Reflectometer. See *Apparatus and Instruments A16–20.*

Refrigeration A4–20. Methyl Chloride. A pamphlet describing the properties and uses of methyl chloride has been issued by the Roessler & Hasslacher Chemical Company. This pamphlet gives a historical sketch of its discovery, manufacture and use, its physical properties, its chemical and physiological properties, its purity and its application as a refrigerant. Address The Roessler & Hasslacher Chemical Company, 709 Sixth Ave., New York.

Textile Manufacture and Clothing A1–20. Bleaching. Articles in the *Textile World Journal* by Allen Abrams and in *Cotton* by J. Merritt Matthews discuss the use of electrolytic bleaching as compared with the use of lime. In both papers the electrolytic bleach is shown to be more convenient to make, more uniform, less liable to change under storage, less expensive, more rapid, better controlled and the cloth bleached with the electrolytic liquors is more easily freed from residual chlorine and other materials than that bleached with bleaching powders. The tensile strength of the goods does not vary in the two methods of treatment.

Wood Products A9–20. Wood Preservation. The Forest Products Laboratory has investigated the possibility of protecting wood by charring. The area of charred wood does not decay or encourage the growth of fungi. This layer, however, is broken in places by checks and infection can enter through these cracks. If charring is deep enough to resist decay the post is weakened. The laboratory has shown that mine timbers could be properly protected by coal-tar creosote, zinc chloride or sodium fluoride when properly impregnated. Address Director, Forest Products Laboratory, Madison, Wis.

B—Research Problems

The purpose of this section of Engineering Research is to bring together those who are working on the same problem for cooperation or conference, to prevent unnecessary duplication of work and to inform the profession of the investigators who are engaged upon research problems. The addresses of these investigators are given for the purpose of correspondence.

Automotive Vehicles and Equipment B4–20. Fan Belts. An investigation to determine the performance of fan belts by using a motor and a typical automobile fan. Revolution counter attached to fan pulley and motor will give slippage. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Automotive Vehicles and Equipment B5–20. International Harvester Co. The Laboratory No. 5 of the Experimental Department of the International Harvester Company is investigating brake lining, clutch facing and fan belting as well as belts, pulleys, pulley coverings and chains. It is making absorption tests on all apparatus and parts of tractors, trucks and stationary engines. Address O. B. Zimmermann, Experimental Department, International Harvester Co., 606 South Michigan Ave., Chicago, Ill.

Electric Power B3–20. Farm Lighting. Laboratory No. 5 of the Experimental Department of the International Harvester Co. is investigating storage batteries for the purpose of determining the best type for farm lighting purposes and also the form of electric generator for the same purpose for variation of speed of 600 per cent. Address O. B. Zimmermann, Experimental Department, International Harvester Co., 606 South Michigan Avenue, Chicago, Ill.

Glass and Ceramics B4–20. Coal-Gas Retorts. Investigation of the thermal qualities, strength and the other properties of gas retorts. Address Kalmus, Comstock & Westcott, Inc., 110 Brookline Ave., Boston, Mass.

Glass and Ceramics B5–20. Glazes. An attempt is being made to differentiate the various glazes applied to clay products by a machine similar to that of Brinell. The steel sphere is replaced by a conical steel point. Penetration is being measured by a micrometer microscope. The pressures are quite high. A study on high-fire porcelain glazes has shown that the range of compositions suitable for high fire increases rapidly with the temperature. Low-silica glazes are found to overfire at temperatures corresponding to cone No. 12. The limits for glazes of temperatures up to cone No. 16 have been established quite definitely. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Glass and Ceramics B6–20. Refractories for By-Product Coke Ovens. A study of the properties of a new silica refractory suggested research for by-product coke-oven refractories, considering the effect of carbonic acid gas, the abrasive action of charge; cooling effect; strength of product in cross-breaking and load; testing under heat and the thermal qualities of the refractory employed. This latter points to the advantage in using special refractory material which develops greater efficiency by reducing the time of coking of charge, quantity of gas used in coking, and permitting radical decrease in the temperature of the combustion of the gas. Address Kalmus, Comstock & Westcott, 110 Brookline Ave., Boston, Mass.

Internal-Combustion Motors B1–20. International Harvester Co. The following investigations are being undertaken by the Laboratory No. 5 of the International Harvester Company:

1 The development of the intake manifolds for tractor engines using kerosene.
2 The increased temperature of the ingoing mixtures produced by the new hot-spot manifolds increases the average temperature of the gases in the cylinders, which affects heat losses to the cylinder and affects valves, spark plugs, etc.
3 Carburetors and mixers for properly metering fuel to vaporizing chambers.
4 Fuel investigations.
5 Air cleaners, their efficiency in cleaning and possible causes for loss of volumetric efficiency in engines.
6 Proper vaporizers, spraying nozzles and metering pumps for high-compression and semi-Diesel oil engines.
7 The Hvid engine's characteristics and durability.
8 General stationary-engine development.
9 Continuous-combustion-engine developments such as pumps, refractories, proper valve timing, and compression problems in connection with the power cylinder.
10 Overheating problems of engines using kerosene.
11 Proper valve areas consistent with the increased temperature of the mixtures for proper vaporization.
12 Automatic and auxiliary intake valve-spring determination for proper spring design.
13 Governor investigations.
14 Radiator problems concerning trucks and tractors.
15 The proper use of anti-friction bearings for crankshafts and their durability.
16 Durability tests on all engine parts to determine proper design.
17 The action of greases on gears in regard to wear, lubrication and power absorbed.

18 Proper methods and procedure for determining proper lubricating oils for internal-combustion engines.

19 Placing of spark plugs and proper materials of construction for use in heavy-duty kerosene-burning engines.

Metallurgy and Metallography B15–20. Decarburization of Steel in Vacuum. A study is being made of steels in vacuo when heated above the A_1 point for different periods. The metal loses carbon on the surface, the amount being proportional to the time of heating. The carbon seems to leave as a gas, probably carbon monoxide. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Steam Power B4–20. Unified Power Plants. Laboratory No. 5 of the Experimental Department of the International Harvester Co. is at work on the development of the unified system of burners, boilers, condensers, pumps and controls for steam power plants. Address O. B. Zimmermann, Experimental Department, International Harvester Co., 606 South Michigan Ave., Chicago, Ill.

Steam Power B5–20. Condenser Tubes. An investigation is being made by the General Electric Company, of Schenectady, and the Diamond Power Specialty Company, of Detroit, on the life of condenser tubes. The investigation is undertaken to determine the possibility of utilizing calorized copper tubes for condensers. Calorizing has proven its value in preventing oxidation of soot-blower units, pyrometer protection tubes and other equipment. It is not known that calorizing has been utilized successfully as a means for preventing corrosion. Information is desired from power plants and marine engineers respecting the service obtained from condenser tubes, and this coöperation is requested. The communication should state the metal of which tubes are made, size and lengths of tubes and life of tubes. Address Robert June, Diamond Power Specialty Company, Detroit, Mich.

C—Research Problems

The purpose of this section of Engineering Research is to bring together persons who desire coöperation in research work or to bring together those who have problems and no equipment with those who are equipped to carry on research. It is hoped that those desiring coöperation or aid will state problems for publication in this section.

Machine Design C3–20. Ball Bearings at High Speeds. The reference to this subject under *Machine Design C2–20* arose from the discussion that as the speed of the ball was increased very materially the centrifugal force became very great, and in such cases large balls are improper because the mass causing centrifugal forces will vary as the cube of the diameter of the ball, while its bearing power will only increase as the diameter. This will mean centrifugal troubles at high speeds. Inquiry is made on this subject. Has any one studied this particular problem or made experiments which would answer questions arising in this study? Address Panfilo Trombetta, General Electric Company, Schenectady, N. Y.

Steam Power C1–20. Condenser Tubes. (See *Steam Power B5–20.*) In this investigation on corrosion of condenser tubes and its prevention, coöperation is asked from engineers of power plants and marine equipment regarding (*a*) metal used for condenser tubes, (*b*) size and lengths of tube and (*c*) life of tubes. Any data will be greatly appreciated for this research. Address Robert June, Diamond Power Specialty Company, Detroit, Mich.

D—Research Equipment

The purpose of this section of Engineering Research is to give in concise form notes regarding the equipment of laboratories for mutual information and for the purpose of informing the profession of the equipment in various laboratories so that persons desiring special investigations may know where such work may be done.

Henry Souther Engineering Company D1–20. Metallurgical Laboratory. The equipment of the Henry Souther Engineering Company devoted to metallurgical and sanitary inspection consists of a chemical laboratory equipped to handle routine metallurgical analysis; organic laboratory equipped to handle materials and compounds such as oils, greases, paints, boiler waters and plating compounds. A physical testing laboratory for tensile, transverse and compression tests, hardness machines, impact testers and fatigue testers. The metallurgical laboratory is equipped for practical heat treatment and metallographic studies of steel, iron, brass, bronze and other alloys. Address Henry Souther Engineering Company, 11 Laurel St., Hartford, Conn.

Hydraulics D1–20. Hydraulic Laboratory at Purdue University. See *Purdue University D1–20.*

Kalmus, Comstock & Westcott, Inc. D1–20. Laboratory for Industrial Research in Ceramics. Laboratory is housed in reinforced-concrete building with water, 110- and 220-volt d.c. current and gas. All power electrical. Especially equipped for refractories and refractory materials.

Equipment:

Muffle furnace, gas- and oil-fired for temperatures up to 1400 deg. cent., atmospheric conditions under control.

Circular pit furnace, gas-fired for temperatures of 1450 to 1500 deg. Load capacity, 6000 lb.

Cross-breaking and compression testing machines.

Leeds & Northrup two-point recording thermometer for base-metal and noble-metal samples.

Special thermal-conductivity-determining apparatus designed and developed at laboratory. Accurate determinations on refractory and insulating materials at 100 to 1000 deg. cent. Apparatus specially designed to guard against side loss.

Small electric muffle furnace for 1000 deg. cent.

36-in. surface grinder, jaw crushers, pulverizers, mixers, driers, air compressors, fans.

Kilns available for standard and special operating conditions.

Address Kalmus, Comstock and Westcott, Inc., 110 Brookline Ave., Boston, Mass.

Minneapolis Steel & Machinery Company D1–20. Metallurgical Laboratory. This laboratory is equipped for physical, metallographical and chemical work. Address C. S. Moody, Metallurgical Engineer, Minneapolis Steel & Machinery Company, Minneapolis, Minn.

Purdue University D1–20. Hydraulic Laboratory. The laboratory established in 1911 has a maximum flow of 8400 gal. per min. at 34 ft. and 1800 gal. per min. at 231 ft. This is produced by pumping. The equipment is as follows:

(*a*) One Platt direct-driven single-stage centrifugal pump with a capacity of 8400 g.p.m. against a maximum head of 34 ft

(*b*) One American two-stage direct-driven centrifugal pump with a capacity of 1800 g.p.m. against a maximum head of 231 ft.

(*c*) One Allis-Chalmers direct-driven single-stage centrifugal pump with a capacity of 400 g.p.m. against a maximum head of 116 ft. The motor is of the d.c. variable-speed type.

(*d*) One Gould triplex pump with a capacity of 60 g.p.m.

(*e*) One 2-in. rotary pump.

(*f*) One Trump 12-in. reaction turbine.

(*g*) One Fairbanks weighing scales of 20 tons capacity. The balance arm of the scale is equipped with an electric timing device.

(*h*) One concrete channel, 3 ft. wide, 3 ft. deep, and 80 ft. long, supplied with track and carriage for current-meter investigations.

(*i*) One large concrete channel, 6 ft. deep and 70 ft. long composed of two sections, one 8 ft. and the other 5 ft. in width. Each section is equipped with a rectangular weir. The flow from the channel passes into the large weighing tank.

The laboratory is 115 ft. by 50 ft. with a main floor and gallery. A concrete reservoir of 82,000 gal. capacity is situated under the main floor. In addition to the apparatus listed above there are a number of small tanks and scales, small impulse wheels, hydraulic ram, orifices, weirs, tubes and water meters. A movable equipment for pitot tubes and current meters up to a maximum range of 5 ft. per sec. is available. The laboratory is in charge of F. W Greve. Address Dean A. A. Potter, Purdue University, Lafayette, Ind.

The Westport Mill D1–20. Chemical Laboratory. Laboratory for chemical and hydrometallurgical work. The laboratory devoted to determining the proper size of Dorr equipments for the Dorr Company, Engineers, New York, Denver and London. Laboratory is equipped for researches dealing with the separation of solutions from finely divided solid substances often of colloidal nature. Purification and preparation of clays and the continuous production of finely ground pigments. Address J. A. Baker, Westport Mill, Westport, Conn.

E—Research Personnel

The purpose of this section of Engineering Research is to give notes of a personal nature regarding the personnel of various laboratories, methods of procedure for commercial work or notes regarding the conduct of various laboratories.

F—Bibliographies

The purpose of this section of Engineering Research is to inform the profession and especially the members of the A.S.M.E. of bibliographies which have been prepared. These bibliographies have been prepared at the request of members, and where the bibliography is not extensive, this is done at the expense of the Society. For bibliographies of a general nature the Society is prepared to make extensive bibliographies at the expense of the Society on approval of the Research Committee. After these bibliographies are prepared they are loaned to the person requesting them for a period of one month. Additional copies are prepared which are available for periods of two weeks to members of the A.S.M.E. or to others recommended by members of the A.S.M.E. These bibliographies are on file in the offices of the Society and are to be loaned on request. The bibliographies are prepared by the staff of the Library of the United Engineering Society which is probably the largest Engineering Library in this country.

Fuels, Gas, Tar and Coke F7–20. Kerosene and Carburation. A bibliography of 2 1/2 pages. Search 3117. Address A.S.M.E., 29 West 39th St., New York.

Pumps F1–20. Jet Apparatus, Injectors and Ejectors. A bibliography of 3 pages. Search 3126. Address A.S.M.E., 29 West 39th St., New York.

WORK OF THE A.S.M.E. BOILER CODE COMMITTEE

THE Boiler Code Committee meets monthly for the purpose of considering communications relative to the Boiler Code. Any one desiring information as to the application of the Code is requested to communicate with the Secretary of the Committee, Mr. C. W. Obert, 29 West 39th St., New York, N. Y.

THE procedure of the Committee in handling the cases is as follows: All inquiries must be in written form before they are accepted for consideration. Copies are sent by the Secretary of the Committee to all of the members of the Committee. The interpretation, in the form of a reply, is then prepared by the Committee and passed upon at a regular meeting of the Committee. This interpretation is later submitted to the Council of the Society for approval, after which it is issued to the inquirer and simultaneously published in MECHANICAL ENGINEERING, in order that any one interested may readily secure the latest information concerning the interpretation.

Below are given the Interpretations of the Committee in Cases Nos. 259, 285, 305, 307, 310, 314–317, inclusive, as formulated at the meeting September 24, 1920, and approved by the Council. In accordance with the Committee's practice, the names of inquirers have been omitted.

CASE No. 259 (Reopened)

Inquiry: Is it allowable, under the requirements of the A.S.M.E. Boiler Code, to fit a high-pressure steam boiler with a blow-off connection larger than $2^1/_2$-in. in case it is to be used initially for low-pressure steam or hot-water heating, or will it be necessary under the requirements of Par. 308 to apply two or more $2^1/_2$-in. blow-off connections for the return connections to the boiler?

Reply: It is the opinion of the Committee that a boiler could be initially fitted with a blow-off connection larger than $2^1/_2$-in. size when intended for use as a steam or hot-water heating boiler, and when converted to a steam boiler if to operate at over 15 lb. pressure, but not exceeding 100 lb. pressure, a reducing fitting could be used at the opening to reduce to the pipe size required for the blow-off connections by Par. 308.

CASE No. 285 (Reopened)

Inquiry: Is is permissible, under the rules of the Boiler Code, to use standard extra-heavy cast-iron flanges and fittings on pipe connections between boilers and attached-type superheaters, and on the ends of superheater inlet headers for pressures up to 250 lb. per sq. in.? It is pointed out that neither the inlet pipe connections nor the superheater inlet flanges would be subjected to other than saturated steam temperatures.

Reply: It is the opinion of the Committee that the flanges and fittings referred to may be made of cast iron, provided the temperature of the steam does not exceed 450 deg. fahr. as specified in Par. 12.

CASE No. 305

Inquiry: Is it permissible, under the requirements of the Boiler Code, to connect sections of wrought-steel headers, one of which is shrunk or forced over the end of the other, making a close fit and secured by means of bolts of ample cross-sectional area, the joint being calked or autogenously welded to insure tightness, the design of the joint to be such that it will be of ample strength, neglecting the holding power due to shrinking or forcing one section over the other and the holding power of the autogenous welding?

Reply: It is the opinion of the Committee that while the construction described is not a desirable one, it is not prohibited by the Code.

CASE No. 307 (Reopened)

Inquiry: Is it permissible to so locate the supporting lugs on h.r.t. boilers where more than four lugs are required and unde Par. 323 of the Code, must be set in pairs, that those in each pair come close together, or must the horizontal distance between the center lines of rivets attaching the adjacent lugs to the shell be at least equal to the vertical spacing of rivets that is required for lug attachments in Par. 323, as shown in Fig. 8?

Reply: There is no requirement in the Code specifying the distance apart of the lugs forming pairs as required by the last sentence of Par. 323. It is the intent of the Boiler Code that the distance between the lugs should be such as to give at least $^1/_2$ in. between the edges of the lugs and not more than 2 in. The load should be equalized between the two lugs.

CASE No. 310

Inquiry: *a* Can a type of boiler other than the h.r.t. type have lap joints where the courses are over 12 ft. long?

b With butt and double strap construction on longitudinal joints for boilers other than of the h.r.t. type, is it required that the tension test specimens be cut from the shell plate as provided in Par. 190?

Reply: *a* The restriction in length of lap joints to 12 ft. in Par. 190 of the Boiler Code applies specifically to boilers of the h.r.t. type, and there is nothing in the rule which prohibits the construction of shells and drums of lengths exceeding 12 ft. for other types of boilers.

b Inasmuch as the first sentence of Par. 190 applies specifically to h.r.t. boilers, as pointed out in reply (*a*), it is the opinion of the Committee that this prohibition does not cover other types of boilers.

CASE No. 314

Inquiry: Is it the opinion of the Boiler Code Committee that a lap joint reinforced with a cover plate should be considered as an ordinary lap joint and the requirements for factors of safety given in Pars. 379 and 380 applied accordingly?

Reply: It is the opinion of the Committee that a lap joint even though reinforced by a cover plate, should be treated exactly the same as the simple form of lap joint, so that the factors of safety proposed in Pars. 379 and 380 for lap joints would be applicable.

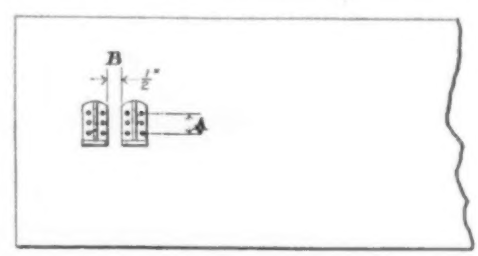

FIG. 8 SPACING OF SUPPORTING LUGS IN PAIRS ON H.R.T. BOILERS

CASE No. 315

Inquiry: Is it to be understood that the requirements of Par. 323 of the Boiler Code, relative to the location of lugs and the distribution of rivets attaching them to the shell, apply to the small sizes of boilers referred to in Par. 324?

Reply: The requirements of Par. 323 of the Code are clearly limited to h.r.t. boilers over 78 in. in diameter. It will be found that Par. 325 gives the requirements for attaching the lugs.

CASE No. 316

Inquiry: Is it permissible, under the requirements of the Boiler Code, for a boiler manufacturer to stamp a boiler as A.S.M.E. Code Standard, when it is fitted with a safety-valve nozzle or connection that is adequate only for safety valves operating at high lifts?

Reply: The way designated in the Code in which the size of the safety valve or valves that shall be used on any boiler is determined, is by their relieving capacity, and where the safety-valve opening corresponds to that required from such a valve or valves, the boiler is constructed in accordance with the A.S.M.E. Code in this respect, and may be so stamped. The Committee suggests, however, that where boilers are sold for a given operating pressure without knowledge of the type of safety valves that will be used, the safety-valve openings be proportioned for the intermediate lifts and corresponding relieving capacities given in Table 15 of the Code.

Case No. 317

Inquiry: If it is permissible, as indicated in Case No. 298, to fit a steam outlet nozzle with a wrought-steel flange screwed to the outer end of the end neck to which the flange is threaded and peened over into a beveled part cut away from the flange, why should not this construction be acceptable for the fastening of the flange at the other end of the nozzle for attachment to the boiler shell?

Reply: It is the opinion of the Committee that this construction does not conform to the requirement of the last sentence in Par. 268.

Data Sheets of the Interpretations of the Boiler Code

As a result of the widespread demand from the steam-boiler field the Boiler Code Committee has inaugurated the practice of reprinting from Mechanical Engineering the Interpretations issued at its regular monthly meetings and approved by the Council, and these are now available for general distribution in data-sheet form, trimmed to convenient size and punched for insertion in suitable binders. These data sheets begin with Case No. 200, which is the first Case formulated by the Boiler Code Committee in interpretations of the 1918 edition of the Code; the Cases from Nos. 1–199 have not been reprinted in this form, as with their incorporation in the new edition of the Boiler Code (edition of 1918) they are superseded and thus rendered of no further service.

These data sheets are available upon application to the office of the Secretary of the Boiler Code Committee, at the prevailing rates charged by the Publication Committee for reprinted matter. They may be obtained singly or in complete sets from Case No. 200 up, as may be desired. Should it be desired to preserve them in a convenient form, this may be accomplished by ordering in addition, a boiler code binder, this being fitted with clamping bolts for binding in not only the data sheets but also the Boiler Code, if desired.

In response to numerous calls that have been received fer copies of these Interpretation data sheets as issued, preparations have been made for supplying them on regular subscriptions as often as issued where ordered in advance. Further information concerning the terms of such subscriptions will be given upon application to the Secretary's office.

Promulgation of the Boiler Code

The American Uniform Boiler-Law Society, organized primarily to secure the legal adoption of the A.S.M.E. Boiler Code, has at the same time used its office to disseminate information and news about the Code.

For example, the society has made a survey of the educational institutions and reports that the following are using the Code as a textbook:

Massachusetts Institute of Technology
Sheffield Scientific School
Yale University
Armour Institute of Technology
Case School of Applied Science
University of Vermont
University of Cincinnati
Johns Hopkins University
University of Michigan
University of Minnesota
Rensselaer Polytechnic Institute

Rutgers College and University of Texas, beginning this year, will also use the Code as a textbook.

The following institutions are using the Code as a reference book:

Vanderbilt University (Tennessee)
New Mexico College of Agriculture and Mechanic Arts
Tulane University of Louisiana
University of Colorado
University of Washington
University of Maine
University of Wyoming
Virginia Polytechnic Institute
Washington University (St Louis)

This survey shows that the Code is having a greater sphere of usefulness than was ever anticipated.

CORRESPONDENCE

Contributions to the Correspondence Department of Mechanical Engineering are solicited. Contributions particularly welcomed are discussions of papers published in this Journal, brief articles of current interest to mechanical engineers, or suggestions from members of The American Society of Mechanical Engineers as to a better conduct of A.S.M.E. affairs.

Code of Ethics Restated

To the Editor:

The following is a restatement of the Proposed Code of Ethics which was published in the September issue of Mechanical Engineering.[1]

In order to remain in good standing in The American Society of Mechanical Engineers a member in any of the grades of the Society shall observe the following rules of conduct:

1 He shall not fail to recognize that the first duty of an engineer is to be a useful citizen, exemplifying in his character and his practice the highest ideals of citizenship and of loyalty to his country.

2 He shall not permit selfish considerations to influence his professional conduct, but shall ever recognize service to society and the public as fundamental in promoting the interests of the engineering profession.

3 He shall not associate himself with any questionable or illegitimate enterprise and shall not countenance such association by a fellow-engineer, but shall endeavor to prevent it, first by friendly counsel and, that failing, by reporting the facts and circumstances to the proper authorities.

4 He shall not accept compensation, pecuniary or otherwise, from more than one interested party and shall not receive, directly or indirectly, any royalty, gratuity, or commission on any patented article or process used in the work upon which he is retained, without the knowledge and consent of all interested parties.

5 He shall not undertake any engineering work in which his judgment or the character of his services might be influenced by his other connections or interests, and he shall not allow his clients' or employers' interests to suffer in any way through his professional relations with others.

6 He shall not knowingly compete with a fellow-engineer in the matter of professional charges, or attempt to supplant him after definite steps have been taken toward his employment; and he shall not take over the work of another consulting engineer without first conferring with him and becoming satisfied that ample reasons exist for a change.

7 He shall not advertise in an undignified, sensational or misleading manner or solicit work by dishonest or unseemly methods; and he shall not countenance sensational, exaggerated or unwarranted statements about his own work in the public press; but may publish to the technical world new inventions, processes, and engineering projects and accomplishments through the engineering societies and the technical press in preference to the public press.

[1] Section Two, p. 123.

8 He shall not misrepresent recognized facts and well-established theories in making reports, or in testifying as an expert; and he shall not confuse newly discovered facts and newly evolved theories with those that have been long accepted; and he shall not jeopardize the good name of the profession by public expression of opinions as an engineer on subjects in which he may not properly qualify as an authority.

9 He shall not make public any information obtained from or through work for a client or employer, nor shall he at any time make such use of it as will embarrass the client or employer in whose service it was obtained, but may use such information as forming part of his professional experience to guide in his own professional practice.

10 He shall not refuse to help his fellow-engineers, by exchange of general information and experience, by personal interest in their welfare or by instruction through engineering societies, schools of applied science, and the technical press, or through the public press under conditions that will insure accuracy and guarantee that such public instruction shall not mislead.

Ann Arbor, Mich. M. E. COOLEY.

Economy of Passenger Automobiles at Various Speeds

TO THE EDITOR:

The limited supply of fuel for automobiles makes it imperative that the cars be run with the minimum amount of gasoline. It is a duty of every owner of a car to save the fuel, not only because it benefits his own pocketbook, but also because it makes more fuel available for the whole nation.

There are certain speeds at which it is most advantageous and economical to run a car, and those who drive automobiles should be requested to coöperate in saving gasoline by driving their cars as closely as possible at these speeds.

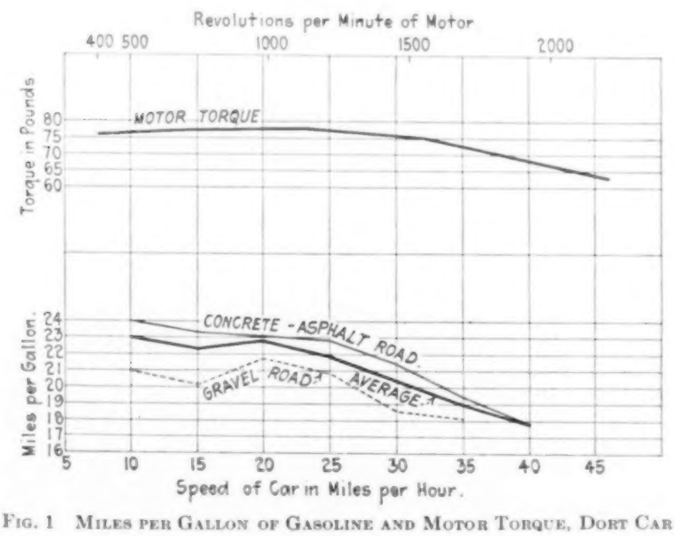

FIG. 1 MILES PER GALLON OF GASOLINE AND MOTOR TORQUE, DORT CAR

Motor, 4-cylinder; bore, $3^1/_2$ in.; stroke, 5 in.; gear ratio, 4.25 to 1; tires, 30 in. by $3^1/_2$ in.; car weight, 2400 lb.

In order to establish the most economical speed for the average automobile, the author has made some very complete and thorough experiments at speeds of 10, 15, 20, 25, 30, 35 and 40 m.p.h.

These tests were made on concrete roads and gravel roads and in the directions north, south, east and west, in order to offset the effect of the wind, which has a marked influence in increasing or decreasing the consumption of gasoline according to whether the automobile travels with or against it. The car used was a Dort car, with a four-cylinder motor, having a $3^1/_2$-in. bore and 5-in. stroke. The weight of the car is 2400 lb. in running order. The size of the tires is 30 by $3^1/_2$ in. The gear ratio on the rear axle is $4^1/_4$ to 1. The load carried corresponded to a three-passenger load, and the top was up with the windshield closed.

The results of these tests are given in Table 1, and show the average gasoline consumption for each speed in the four directions of the compass. In Fig. 1 the tests are condensed into a single average and a curve is drawn which shows at a glance the most economical speed of the car.

TABLE 1 ECONOMY OF LIGHT CAR AT VARIOUS SPEEDS

4 cyl. motor, $3^1/_2$-in. bore, 5-in. stroke; gear ratio, 4.25 to 1; wheels, 30 in. by $3^1/_2$ in.; car weight, 2400 lb.; 3 passengers.

Miles per hr.	Road	Direction	Temp. deg. fahr.	Weather	Date	Miles per gal.
10	Concrete	South	80	Clear	Sept. 8/20	23.6
10	Concrete	North	80	Clear	Sept. 8/20	25.6
10	Concrete	South	80	Clear	Sept. 8/20	21.2
10	Concrete	North	80	Clear	Sept. 8/20	25.6
10	Gravel	West	75	Cloudy	Sept. 9/20	21.4
10	Gravel	East	75	Cloudy	Sept. 9/20	20.6
					Average,	23.0
15	Concrete	South	75	Clear	Sept. 3/20	23.2
15	$^2/_3$ concrete, $^1/_3$ sand	South	75	Clear	Sept. 3/20	22.4
15	$^2/_3$ concrete, $^1/_3$ sand	North	75	Clear	Sept. 3/20	24.0
15	Concrete	North	75	Clear	Sept. 3/20	25.2
15	$^2/_3$ concrete, $^1/_3$ gravel	East	75	Clear	Sept. 3/20	25.4
15	$^2/_3$ concrete, $^1/_3$ gravel	West	75	Clear	Sept. 3/20	24.4
15	Dry gravel	West and south	75	Clear	Sept. 3/20	21.6
15	Loose gravel	East	75	Clear	Sept. 3/20	18.0
15	Loose gravel	West	75	Clear	Sept. 3/20	19.4
15	Concrete	South	80	Clear	Sept. 8/20	21.2
15	Concrete	North	80	Clear	Sept. 8/20	23.6
15	Wet gravel	West	75	Cloudy	Sept. 9/20	21.2
15	Wet gravel	East	75	Cloudy	Sept. 9/20	20.4
					Average,	22.3
20	Concrete	South	75	Clear	Sept. 3/20	21.8
20	Concrete	North	75	Clear	Sept. 3/20	22.4
20	Concrete	South	80	Clear	Sept. 8/20	21.8
20	Concrete	North	80	Clear	Sept. 8/20	24.8
20	Wet gravel	West	75	Cloudy	Sept. 9/20	22.8
20	Wet gravel	East	75	Cloudy	Sept. 9/20	20.8
20	Wet concrete	North	75	Cloudy	Sept. 9/20	23.6
20	Wet concrete	South	75	Cloudy	Sept. 9/20	22.6
20	Concrete	South	75	Clear	Sept. 13/20	23.0
20	Concrete	North	75	Clear	Sept. 13/20	25.0
					Average,	22.86
25	Concrete	South	75	Clear	Sept. 4/20	24.4
25	Concrete	North	75	Clear	Sept. 4/20	22.4
25	Concrete	East	80	Clear	July 1/20	22.0
25	$^1/_2$ gravel, $^1/_2$ concrete	North	80	Clear	July 1/20	23.2
25	Concrete	South	80	Clear	Sept. 8/20	21.0
25	Concrete	North	80	Clear	Sept. 8/20	24.0
25	Dry gravel	West	70	Clear	Sept. 13/20	20.4
25	Dry gravel	East	70	Clear	Sept. 13/20	21.2
25	$^1/_2$ gravel, $^1/_2$ concrete	East and north	70	Clear	Sept. 13/20	21.2
25	$^1/_2$ gravel, $^1/_2$ concrete	South and west	70	Clear	Sept. 13/20	18.8
					Average,	21.86
30	Concrete	North	80	Clear	July 1/20	24.0
30	Concrete	South	80	Clear	July 1/20	20.4
30	Concrete	South	75	Clear	Sept. 4/20	20.4
30	Concrete	North	75	Clear	Sept. 4/20	21.0
30	Concrete	South	75	Cloudy	Sept. 9/20	20.0
30	Concrete	North	75	Cloudy	Sept. 9/20	24.4
30	Dry gravel	West	70	Clear	Sept. 13/20	19.0
30	Dry gravel	East	70	Clear	Sept. 13/20	20.8
30	Concrete	North	70	Clear	Sept. 13/20	20.0
30	Dry gravel	West	70	Clear	Sept. 13/20	17.6
30	Dry gravel	East	70	Clear	Sept. 13/20	16.8
					Average,	20.4
35	Concrete	South	75	Clear	Sept. 4/20	18.0
35	Concrete	North	75	Clear	Sept. 4/20	19.6
35	Concrete	South	75	Clear	Sept. 9/20	18.4
35	Concrete	North	75	Clear	Sept. 9/20	22.0
35	Dry gravel	West	70	Clear	Sept. 13/20	17.4
35	Dry gravel	East	70	Clear	Sept. 13/20	19.0
					Average,	19.06
40	Concrete	South	75	Cloudy	Sept. 11/20	16.0
40	Concrete	North	75	Cloudy	Sept. 11/20	19.6
					Average,	17.8

A curve of the motor torque is plotted above the economy curve in Fig. 1, and an examination of these curves will show that the economy curve follows the torque curve very closely, with a tendency for the former to fall faster above 25 m.p.h., due to the increased wind resistance. It would seem logical, therefore, in order to get the greatest possible economy out of the cars, to lower the gear ratio in the rear axle, thereby reducing the engine speed, or else to have a geared-up fourth speed in the transmission.

It is to be noted that after a speed of 25 m.p.h. is reached the economy curve falls down very fast; therefore it would be to the interest of car owners to drive their vehicles at a speed not exceeding 30 m.p.h. in order to get the best results. A speed of approximately 30 m.p.h. is about the maximum speed at which a car can be driven with safety on our present roads. Of course, it is almost impossible to establish arbitrarily a limit of 30 m.p.h. for the maximum speed of an automobile, as the engineer must take into account the poor roads which are encountered in various parts of the country, where more power is needed to pull the car through, but a car with a maximum possible speed of 40 m.p.h. on good roads would have enough power to go anywhere.

The tests show very plainly that a concrete-asphalt road gives a much better mileage than the ordinary gravel road or the sandy road, and consequently, as the building of good hard roads progresses throughout the country, the economy in gas consumption will become greater.

If these different facts are given wide publicity, not only by the oil industry but by the automotive industry and the public press, it will show to the governments of the states, and to the Federal Government, that the sooner we build up a smooth, solid type of highways all through the country, the quicker will we get better mileage in the operation of motor cars and motor trucks, and the conservation of our natural resources in oil will be greatly enhanced.

Certain emphasis has been laid on the fact that the automotive manufacturers ought to build lighter cars, which would give the necessary comfort with less waste of gas. A number of manufacturers are already producing such cars; but the majority of cars on the market in the light-weight class are great wasters of gasoline as they average only between 15 and 16 miles to the gallon, due to their very inefficient motors.

From the author's experience, a car with a weight not to exceed 2000 lb. in running order, without passengers, should give easily 25 to 30 miles to the gallon; a car weighing between 2000 and 2500 lb. under the same conditions should give, easily, between 20 and 25 miles per gallon; and the heavier cars up to 3000 lb. weight should give 16 to 20 miles to the gallon, without any question. However, the efficiency of the motor alone is not all that is necessary to obtain these figures. The car should be kept in good order, with the brake drums free from dragging brakes, tires should be inflated to their proper pressure, and the lubrication of the complete car well taken care of in order to get the maximum efficiency.

These different points will be brought to the front more and more as the number of automobiles increases and it becomes imperative to use less gasoline per automobile in order to have enough for everybody.

E. Planche.

Flint, Mich.

Effect of Radial Play on Life of Ball Bearings

To the Editor:

Tests have recently been made by the Fafnir Bearing Company to determine the effect of radial play on the life of ball bearings which it may be of interest to report. By radial play is meant the amount of shake or looseness between the inner and outer rings in a direction at right angles to the bore. This play is measured after the bearing is completely assembled ready for shipment, and by the use of a special gage employed in the inspection of Fafnir bearings.

Most users of ball bearings demand that the radial play be very small, some specifying that it shall not exceed 0.001 in. They consider it sufficient that a bearing should run freely before being mounted and that no perceptible play exist.

At first one would believe that the less play the better, as long as the bearing is free to turn. One must consider, however, that the examination or inspection of ball bearings is made before mounting and that the mountings call for a drive fit of the inner ring over the shaft, and sometimes the outer ring is also forced into its housing. Several tests were made to determine what effect this forcing of the bearings into place had. It was found that inner rings expanded from 0.0003 to 0.0004 in., and outer rings contracted from 0.0002 to 0.0003 in., these measurements being made when press fits were used.

These facts make it apparent that the radial play must be considered after the bearing has been mounted. It is of course impossible in most installations to measure radial play after the bearing is mounted, but it is quite possible to measure the expansion and contraction of inner and outer rings. When an average value has been established for these two items, the problem is simplified. For instance, consider a bearing having a play of 0.0005 in. before mounting, and a mounting that causes an expansion of 0.0002 in. of the inner ring and a contraction of 0.0001 in. of the outer ring. The radial play after mounting will be the sum of the expansion plus the contraction (0.0001 + 0.0002 = 0.0003) subtracted from the play before mounting (0.0005 — 0.0003 = 0.0002). Hence the radial play after mounting is very different from that in the unmounted bearing.

It is quite evident that under certain conditions the bearing may be loose enough to turn easily before mounting and may be entirely too tight afterward. In order to determine whether or not a tight bearing wears out faster than a loose one a series of tests was made, the results of which are tabulated below. It must be remembered that the radial play of these test bearings was measured before mounting in the test block. The test mounting reduced the play in each case by about 0.0002 in.

Bearing No.	Radial Play, Inches — Before Mounting	Radial Play, Inches — After Mounting	Hr. Run	Remarks
1	0.0000	Cramped	347	Failed at this time
2	0.0000	Cramped	477	
3	0.0002	0.0000	323	
4	0.0002	0.0000	477	
5	0.0004	0.0002	571	No signs of failure
6	0.0008	0.0006	803	
7	0.0012	0.0010	571	
8	0.0012	0.0010	585	

These results indicate that the play should be at least 0.0005 in. after mounting. The necessary play before mounting must be determined for each condition of installation. This must be done by the user under average conditions as he finds them.

In conclusion, it may be well to point out that there is a slight variation of play in all bearings. This is due to the fact that a slight tolerance or variation must be permitted to make bearing manufacture commercially possible. This variation in radial play is usually about 0.0005 in. but for large bearings may exceed this. Thus a specification should read that the radial play must in no case be less than a certain amount. This amount is determined from the known expansion and contraction of the rings as pointed out above.

Roland W. Sellew.

New Britain, Conn.

ORGANIZATION AND CONSTRUCTION OF DYE HOUSES

(Continued from page 674)

Dye-House Piping

Each kettle has a hot-water, a cold-water and a steam connection which means a good deal of piping to care for and it should be laid out so as to be accessible and permit of changes. All cold-water piping must be below ground and is usually of cast iron run along the inside of the trench on the same supports as the machines. The high- and low-pressure steam and hot-water piping are run overhead and covered.

Steam Supply. The objection to the use of low-pressure steam in dye houses for boiling kettles has about vanished, and where an ample supply of clean low-pressure steam is available, as from either bleeder or non-condensing turbines, a considerable economy can be effected. For worsted piece dyes this steam must be free from oil, but in stock dyeing for woolens the exhaust from reciprocating engines can be used without injurious results if proper precautions are taken. If low-pressure instead of high-pressure steam is used at the kettles, the pipe sizes must be increased. Low-pressure systems have been condensed because of a failure to take this into consideration. A careful study should be made of the steam requirements of the dye house under consideration, especially with reference to peak loads and the pipe sizes proportioned to meet these conditions. The piping should be ample to provide for the future growth of the dye house and the possible rearrangement and changing of machinery. It is difficult because of the varying load in the dye house to maintain an economical heat balance, but much can be done in the way of economy by careful arrangement and the use of surplus steam to heat the water supply.

Warm-Water Supply. There should be provided, either close to the dye house or as part of it, an ample supply of warm water for washers, crabs, rinsing and such dye baths as can start with warm water. The simplest way to accomplish this is by means of wood storage tanks located high enough so that the water will flow by gravity to the machines. The water can be heated by exhaust steam or any other means. If there is a surface condenser in the power plant the circulating water can be used, and with a small sacrifice in vacuum can be delivered at about 120 deg. and pumped from the hot well to the tanks. The effect of this hot-water supply is to speed up the dye-house operations and reduce the peak load on the boilers.

Appeal to Members of The American Society of Mechanical Engineers on Behalf of Nolan Patent Office Bill H.R. 11,984

MEMBERS of The American Society of Mechanical Engineers are requested by the Committee on Patents of Engineering Council to communicate at once with their Representatives and Senators in Congress, and to Hon. John I. Nolan and Senator George W. Norris, who are the chairmen of the Patent Committees of the House and Senate, respectively, urging action upon the Nolan Patent Bill H. R. 11,984, in accordance with resolutions passed on October 21 by Engineering Council.

This bill has passed both the House of Representatives and the Senate and is shortly to be considered by a Conference Committee of the House and the Senate. As passed by the Senate, amendments were made reducing the patent-office force and salaries of the examining and clerical force in a way to make both seriously inadequate; and further, certain riders were made part of the bill, the effect of which would undoubtedly be to delay its passage.

The specific request of the Committee on Patents is that members ask to have the original values of the figures for the examining and clerical force of the Patent Office and the salaries of the employees restored, and that the riders be eliminated. The text of the Committee's recommendations and of the resolutions of Engineering Council (in abstract) are appended so that any members who desire to take action may have all the facts at their disposal.

The members of the Society will doubtless remember that they, in coöperation with the engineering societies represented in Engineering Council, together with other scientific and industrial organizations, have been giving support to an effort to relieve the present desperate condition of the United States Patent Office by passing Nolan Patent Office Bill H. R. 11,984.

The purpose of this bill is to increase the examining and clerical forces of the Patent Office and to raise their salaries so as to give that office a sufficient force and at salaries that will attract and hold competent men to enable it to make its examinations with that reasonable promptness which is necessary to make it worth while applying for them and with such thoroughness as to reduce the percentage of errors to as low a limit as sufficient time for the work and proper qualifications can possibly effect.

Engineering Council appointed its Patents Committee for the purpose of aiding the Nolan bill and urged the membership of the constituent societies to communicate with the Patent Committees of the House of Representatives and the Senate and with the Representatives and Senators from the districts and states of the respective members on behalf of the said bill. The influence thus exerted, and that of other organizations, was so powerful that, at a hearing before the Rules Committee of the House of Representatives, which was largely attended by officers of members of Engineering Council and of the said societies and organizations, the Nolan bill was ordered made special and the House of Representatives promptly passed it without amendment by a very large majority.

A similar hearing on the bill was held by the Patent Committee of the Senate, but, in order to remove objection to unanimous consent to a special hearing by the Senate, before adjournment of the session, the Patent Committee of the Senate consented to amendments so seriously reducing the force and salaries of the bill as passed by the House of Representatives as to reduce the examining and clerical forces below the numbers now actually employed in the Patent Office. The increases of the salaries provided in the bill were also cut down to where they are seriously inadequate to attract or hold a sufficient number of qualified men to enable the Patent Office to do its work. The steady exodus of examiners from the Patent Office, which has been going on for some time, has not been stayed at all by the passage of the bill by the Senate.

The bill was referred by the Senate to a Conference Committee, of which the Senate members are: Senator Geo. W. Norris, of Nebraska, Senator Geo. B. Brandegee, of Connecticut, and Senator William F. Kirby, of Arkansas.

The members of the Conference Committee for the House of Representatives have not been appointed, but Hon. John I. Nolan, of California, is certain to be one.

Engineering Council, regarding the matter as of grave importance, unanimously passed the following resolutions on October 21, 1920:

RESOLUTIONS OF ENGINEERING COUNCIL CONCERNING NOLAN PATENT OFFICE BILL

(Limited space has made it necessary to give these in abstract)

WHEREAS, the salaries of examiners, except for a war bonus, have only been increased ten per cent in seventy years and are so low that resignations of examiners are constantly occurring in a steady stream, averaging twenty-five per cent per annum, and resulting in such frequent changes that much inefficiency unavoidably results therefrom, even where examiners are qualified for the work, and many men are necessarily employed as examiners who cannot pass the examination required to qualify for their positions; and the salaries of the clerical forces are considerably below the average of salaries for corresponding work in the governmental departments generally; and

WHEREAS, as a partial remedy for such situation Nolan Bill H. R. 11,984 was introduced into Congress providing for an increase in the examining corps of the Patent Office of but five and eight-tenths per cent and an increase in the clerical force of but three and nine-tenths per cent, and providing increases in the salary for the position of primary examiners from \$2700 to \$3900 and of assistant examiners in proportion, and providing increases in the salaries of the clerical force only to bring them up approximately to the average corresponding salaries of other Government Departments and Bureaus, and as the cost of the increased salaries and force of the said Nolan Bill was more than met by an increase in the fees for patents provided therein; and

WHEREAS, the United States Senate so amended the said Nolan bill that instead of increasing it decreases the examining corps by fifteen and seven-tenths per cent and reduces the clerical force by about one per cent below the present insufficient numbers of said examining corps and clerical force actually employed in the Patent Office, as well as reduces the salaries, both of the examining and the clerical forces, so that the total present payroll is reduced five and nine-tenths per cent, notwithstanding that the increase in the fees for patents which were made to provide funds for the increased force and salaries were retained in the bill;

NOW, THEREFORE, BE IT RESOLVED: That Engineering Council, representing 45,000 engineers, regards it of large importance that the numbers of the examining and clerical forces for the Patent Office and the salaries therefore in Nolan Patent Bill H. R. 11,984 be restored to those in the bill as it passed the House of Representatives; that the bill be freed from any riders, such as Section 9 thereof, which may delay or jeopardize the passage thereof, and that the bill be made a law at the earliest possible moment.

As the Patent Office is steadily losing more and more of its competent men and is rapidly getting farther and farther behind in its work, and as to get much farther behind would mean for it practically to cease to function, and as the bill, as amended by the Senate, is wholly inadequate to accomplish its purpose, and would be worse than useless, every effort should be made to induce Congress to restore the figures of the bill to their values as passed by the House of Representatives.

The Conference Committee will probably take the bill up for consideration the middle or latter part of December. Each member of the Society is therefore most earnestly requested to write or telegraph to the member of Congress from his District, to the Senators from his state and to the members of the Conference Committee, urging that the figures of the Nolan Patent Office Bill H. R. 11,984 be restored to the values which passed the House of Representatives.

It would also be well to urge that the bill be freed from any riders not related thereto, so that its early enactment will not be hindered by opposition to such riders.

The names of the senators and representatives can be obtained from the World Almanac, or similar publications, and from postmasters.

In connection with this bill, engineers, as a class, for the first time, have exerted a powerful influence in a public matter, and they should see that their work is brought to a successful conclusion.

Yours very truly,

J. PARKE CHANNING
Chairman, Engineering Council

EDWIN J. PRINDLE, *Chairman*
J. PARKE CHANNING, *Secretary*
EDWIN J. PRINDLE (*A.S.M.E. Representative*)
D. S. JACOBUS (*A.S.M.E. Representative*)

DeLamater Collection Presented to A.S.M.E.

Messrs. Sydney and Victor DeLamater Bevin, members of The American Society of Mechanical Engineers, and descendants of Cornelius H. DeLamater, have recently presented to the Society the models, medals and plans formerly belonging to him. The collection consists of:

a One model solar engine, 6 in. high, made of brass and steel, in working condition
b One model hot-air engine of similar construction, in working condition
c One model steam engine
d One model cannon, mortar type
e Several medals awarded to C. H. DeLamater
f Set of miscellaneous plans belonging to the DeLamater Iron Works.

These articles, which are of historic value to the science of mechanical engineering, have been placed in the headquarters of The American Society of Mechanical Engineers at 29 West 39th Street, New York, N. Y.

MECHANICAL ENGINEERING

The Monthly Journal Published by The American Society of Mechanical Engineers

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Why Not By-Product Producer Gas?

Robert H. Fernald

THE rapid exhaustion of our natural-gas supply through criminal negligence and reckless extravagance resulting in drastic restrictions in order to conserve what little we have left brings us abruptly to a realization of the situation and leads us seriously to query regarding possible substitutions for this remarkable natural fuel.

The situation is acute. It is therefore imperative that we begin exhaustive investigations to determine the most practical solution of the industrial problems that have been for many years past so vitally dependent upon our natural-gas supply. The results reached through such investigations may lead into channels quite different from those under consideration at the present time, as the necessity of the situation may develop unthought-of possibilities.

With the limited amount of study that has been given to this problem to date, the most conspicuous source of relief seems to be through the development of by-product producer gas. This, of course, is practically an unknown field in the United States. Spasmodic attempts to develop interest have come to the attention of engineers from time to time but no serious study of the situation in its relation to the larger commercial developments of the country has as yet been undertaken.

In Europe we find by-product producer gas somewhat extensively used and the large central station near the mines, recovering the by-products from the fuel and distributing the gas under pressure for several miles through the industrial districts, has become a dependable source of supply.

Such plants produce in the neighborhood of 135,000 cu. ft. of 150-B.t.u. gas in addition to some 85 lb. of sulphate of ammonia and 100 lb. of water-free tar as by-products per ton of coal gasified. The sulphate of ammonia alone brings a handsome return to the plant, as it is worth, in normal times, about 3 cents a pound or \$60 a net ton. The price for the last few years has, of course, been considerably higher.

The gas from one of the large central by-product plants in England is used for some thirty or forty separate purposes, including melting, welding, annealing, vulcanizing, hardening, enameling, and brazing, outside of a large demand for power. The gas is sold at from $1\frac{1}{2}$ to $2\frac{3}{4}$ pence per 1000 cu. ft., depending upon the volume of consumption. The net cost of the gas per 1000 cu. ft. for the year 1912 based on 40,000 tons of coal gasified, was 1.287 pence. This selling price of $1\frac{1}{2}$ to $2\frac{3}{4}$ pence is equivalent to about 3 to 5.5 cents per 1000 cu. ft. This, of course, is for gas averaging 150 B.t.u. per cu. ft., which is equivalent to from 12 to 22 cents for 600-B.t.u. gas or from 20 to 37 cents for 1000-B.t.u. gas based on the relative B.t.u. values alone.

Through the abundance of our fuel supply and our indifference to the needs of future generations, we have been ruthlessly extravagant and wasteful of our fuel resources during the past decades. An appreciation of the necessity of recovering by-products has but recently received thoughtful consideration from those agencies that are most seriously interested in the problems of fuel conservation.

At the present moment, low-temperature distillation processes are attracting more than casual attention. Investigation may show a combination of low-temperature distillation and the manufacture of by-product producer gas to be a distinctly economical and commercial solution of our natural-gas problems, as these processes, on the one hand, lead to the maximum by-product recovery and on the other, to a supply of gas commercially adaptable to heating and general industrial processes.

Our natural-gas situation is a serious one. The solution requires more than the casual financial interest of the private dividend seeker. It requires systematic study and research involving the expenditure of large sums of money. It is a problem of national importance and must be attacked on a broad basis. It calls for the best thought and most serious consideration of the ablest experts available, financially supported from sources that will guarantee the results of the investigation to be free from industrial or commercial bias.

It has been estimated that two decades will see the total exhaustion of the natural-gas supply. We cannot afford to wait longer.

Should not the engineering profession appeal to the Government n no uncertain terms regarding this necessity and see that the problem is vigorously attacked before the crisis is upon us?

Robert H. Fernald.

Forty Years Ago

The fortieth Anniversary meetings of The American Society of Mechanical Engineers held last month in various cities make it interesting to recall certain events in the mechanical engineering field which indicate what was the state of the art in 1880 when the Society was founded. A remarkable portrayal of the situation at that time is contained in the presidential address of the late Robert H. Thurston, given before the Society in 1881.

Unquestionably, the absorbing topic of the time was the promise of electricity as a useful agent in industry. The Brush dynamo-electric machine had been invented in 1876 and the Edison carbon-filament incandescent lamp in 1880. Three years later, so rapid had been the progress of the electric light, that there were 400 electric-light stations in operation in this country. The possibilities of this development are told so fascinatingly by Doctor Thurston that his allusion to the subject in his presidential address is here quoted in full:

"That feature of recent progress in engineering which is today attracting most attention and awakening most interest in the minds of the public as well as of the profession, is the introduction of machine-made electricity, and of the electric light, but what seems to me the most important phase of this impending revolution, is I think, not yet generally comprehended. By the ingenuity and skill, the courage and persistence, the energy and enterprise of our brother engineers, Brush and Edison and their coadjutors, it seems certain that the dream of the great author of "The Coming Race"

will in part be speedily realized, and that for the occasional mild light of the moon, or the yellow sickly flare of the gas flame, will soon be substituted the less uncertain and always available, and always beautiful and mellow, radiance of the electric flame. This is but a beginning, however. A few months ago one of the most earnest and best workers of all who have been with me, at once, friends and pupils, made a very painstaking investigation of the efficiency of a powerful dynamo-electric machine kindly loaned him from Menlo Park. The mean of several series of tests gave, as a result, an efficiency of between 90 and 95 per cent. That is to say, of all the power transmitted to the machine from the steam engine driving it, over 90 per cent appeared on the wire in the form of electrical energy. It follows at once that mechanical power may be transmitted through two such machines, again appearing as mechanical power, with a loss of less than 20 per cent. And it follows from this last fact that the distribution of power by electricity is not unlikely to prove a more important application of this wonderful force than is the electric light."

Inasmuch as we have just emerged from the Great War, it may be noted that it was only in 1880 that the manufacture of modern steel guns was projected in this country, with imported Whitworth steel: and that it was not until several years later that the Whitworth fluid-compression process for steel forgings, both for artillery and for the heavy parts of steam and electric machinery, was introduced in this country. In general, this period was marked by the substitution of high-carbon steel forgings for wrought-iron forgings, and of mild-steel plates for boilers and ships in place of wrought-iron plates, a fact alluded to by Doctor Thurston.

In 1880 the Corliss engine was supreme—it was a period of transition between the big, slow-moving, low-powered Corliss steam engine of the Centennial and the high-speed engine of the nineties. The Otto "silent" gas engine had been in the country four years and held the field until the expiration of the Otto patents in 1890. Referring to steam engineering and the gas engine, Doctor Thurston said in part:

"This figure—16 lb. of steam per hr. and per hp.—(from a Leavitt hoisting engine at Hecla) may be put on record as the very best economy attained by our best engineers at the end of the decade 1870–1880. It is just double the weight which would be required in a perfect engine working steam of the same pressure at maximum efficiency.

"The compressed-air engine, the petroleum engine, and the gas-engine are all just now coming forward. I have no figures that I can rely upon except for the gas engine, which sometimes consumes as little as 28 cu. ft. of gas (1 cubic meter nearly) per hr. per hp.

"Today a steam pressure of six atmospheres (75 lb. per sq. in.) is usual, and 7 atmospheres (90 lb.) is often adopted. Increased pressure has been accompanied by increased speed of piston—from 300 to 500 ft. per min.—and both causes have combined to reduce greatly the size and weight of engines. The consumption of fuel per hour and per horsepower has decreased from 2 lb. to 1.8 lb."

The error which had been fallen into by many writers on the steam engine to the effect that the condensation in the steam-engine cylinder was due solely to the conversion of heat into work, was also pointed out by Doctor Thurston, who said: "It is becoming generally recognized and writers are in a fair way to learn that it is not the fact that the greater part of the liquid water which collects in unjacketed cylinders is produced by liquefaction of steam during its expansion, but that this latter amount is insignificant and that this comes of cylinder condensation, sometimes with a considerable leakage, and often amounts to half or more of all the fluid supplied to the boiler." In other words, the action of steam in the engine cylinder was but beginning to be understood by engineers in general.

Locomotive practice is summed up as follows:

"Locomotives are frequently built weighing 50 tons; 70 tons has been reached, and every builder of engines is ready to guarantee the performance of an engine to draw 2000 tons 20 miles an hour on a level track. In coal consumption we have made some saving of late years. Three pounds of coal per hour and per horsepower is a usual amount, and a consumption of 2.6 lb. of coal, and of $22^1/_2$ lb. steam has been reported from recent tests."

Finally, in two trite but effective sentences the labor situation is thus recorded:

"When the last generation was in its prime our factories were in operation 12 or 13 hours: 'Man's work was from sun to sun, and woman's work was never done.' Today man works ten hours, and woman is coming to a stage in which she will work where, when, and how she pleases."

Finding Jobs for Things

One of the most interesting branches of modern engineering is that which deals with the discovery of new uses for materials and equipment which have lost their applications and remain for a while, so to speak, jobless. The war, in particular, may be regarded as an example of an immensely vast industry which has ceased, and whose raw materials, formerly developed for the destruction of life and property, must now be put to some useful purpose.

For a great many materials "jobs" have already been found, and what follows must therefore be considered merely as examples and possible suggestions of future applications.

During the war, as a protection against the employment of poison gases, highly efficient gas masks were developed, and now that the war is over it is an obvious step to apply them to mine-rescue work and the protection of men engaged in handling poisonous materials. A less obvious matter is that of utilizing ill-smelling gases, a vast number of which were developed for military purposes. It is now suggested that such gases should be used in mines to notify the men, in case of accident, of the necessity for escape; for tests have shown, especially in mines supplied with artificial ventilation, that ill-smelling gases carry their message more rapidly and certainly than sounding devices.

Another war development which is finding application in peace time is the guide cable which was employed by the Germans around Heligoland to permit submarines to return through the mine field to their bases. The cable was laid in such a manner as to indicate safe passage and oscillations sent through it could be caught by an appropriately attuned receiver. At the present time experiments are being carried out by the U. S. Navy with a view to applying the same scheme for guidance of vessels entering harbors in a fog.

But the problem that is of particular importance, however, is in connection with the numberless materials which are becoming available every year as by-products of other manufactures. Selenium is one of these. Before the war it was almost exclusively used for electrical purposes, where its value lay in the fact that its electrical conductivity varies with the intensity of the light to which it is exposed. During the war, when this country experienced a great shortage of manganese, selenium was extensively used to take the place of this material in glass manufacture. The amount which is produced in the copper industry, however, is so large that it has become an important problem to find some peace-time commercial application for this interesting material. It has been recently announced that such an application has been found, due to the discovery of the fact that selenium oxychloride is a powerful solvent for a number of materials such as paraffin, etc.

There is still a third problem associated with this discovery of new uses for materials and it deals with the employment of rare materials. Vanadium, for instance, was for many years known only as a laboratory curiosity. It was known, in general, that it improved the quality of steel, but not enough of it was available to make the work of investigation worth while. Shortly, however, great deposits of it were found among the hitherto inaccessible peaks of the mountain ranges of Peru and in a few years vanadium became a recognized agency in the production of high-grade steel, for which at just about the same time, a big demand was created by the automobile industry.

Another similar material, molybdenum, is still in what might be called a probationary stage. It is well established that under certain conditions molybdenum does improve steel, but just what these conditions are is still a somewhat mooted question; furthermore it is not as yet definitely established whether or not the same results can be obtained at the same cost with such other materials as tungsten or chromium.

There are, however, many materials produced or available in quite substantial quantities for which no suitable use has as yet

been discovered. As such may be mentioned, for example, calcium chloride, which is a by-product of soda manufacture.

Another by-product which is still waiting for some one to discover a use for it is straw. Of this many millions of tons are produced a year, and yet, notwithstanding the active work done by the various departments of the Government and in private laboratories, no real use has been found, which may be due partly to the fact that straw is a seasonal material and as such is particularly difficult to handle commercially.

The question of utilization of either waste or idle materials is a large one for our national industries, as it represents one of the most logical ways to cut down the unit costs of production. The packing industry realized this many years ago and boasted for years that everything in the pig except the squeal was put to commercial use. In fact, it is believed that one of the reasons for the tremendous growth of packing establishments and the very generous profits which they have made for their stockholders has been this very fact of utilizing practically 100 per cent of what goes into the stockyards.

The mechanical industries are still very far from this ideal, although doubtless the present high costs of labor, materials, and doing business generally, are proving to be a powerful incentive toward eliminating all sources of waste and putting all by-products possible to useful employment.

Fuel and Power Conservation on the Pacific Coast

Special Correspondence

At the present time engineering affairs on the Pacific Coast are rather quiet, and I think it might be said that the great majority of what might be called engineering or industrial capital is feeling its way very carefully before deciding on any investment of funds. This is partly due to the political situation, but more I think to the great uncertainty as to future moves of labor organizations.

Recent conditions on the Pacific Coast have concentrated the attention of engineers there on the question of power supply and the more economical use of power. Inadequate rainfall for three successive seasons and a very light precipitation of snow in the mountains had, during September of this year, forced the power administrator of California to issue an order that all power users must reduce their consumption twenty per cent and that all electric display signs and unnecessary lighting must be discontinued.

During this same three-year period the cost of fuel oil, the universal industrial fuel of California, had risen by leaps and bounds, and early in the spring of this year managers of industry were thrown into a near panic by the publicity given to the fact that our available supplies of fuel oil were almost exhausted. These facts and circumstances have combined to direct the attention of engineers very emphatically to the problem of power conservation, and much activity is evident in that direction.

One very interesting instance of this activity lies in the careful investigation which is being made by railroad engineers into the economy of electrifying all of their lines and also into the problem of applying Diesel engines to train propulsion, and the suggestion has been made that perhaps these two propulsive methods might be combined.

The great difficulty in applying the Diesel or any other internal-combustion engine to railway propulsion lies in securing sufficient initial torque for starting a train. This, of course, could be readily overcome by using an electric locomotive which would be coupled with a Diesel-electric generating plant on a separate tender or car. This equipment could be used on portions of the rights of way distant from hydroelectric development. The same locomotives could pick up power from transmission lines where they were readily available.

Probably the greatest benefit which will be derived from this power-conservation movement will come through a careful engineering survey of the sources of supply and a concerted coöperative effort to apply power from those sources in the most efficient and useful manner. Undoubtedly, as has been pointed out in many articles in the technical press, the majority of power users are wasting a large percentage of the power in its application. This is particularly true in the plants which have sprung up during the emergency shipbuilding program, many of which are now endeavoring to adjust themselves to the changed conditions and to compete in general and industrial engineering practice.

When we consider the economies that can be gained from installation of the best apparatus for the utilization of the energy in fuels as compared with the very low percentage of that energy utilized by the makeshifts often in use, we are almost forced to the conclusion that the use of much of this apparatus should be made an economic crime and that all applications of power should be under proper supervision. As Franklin K. Lane has so well said, every man who uses fuel oil under a steam boiler should be made to show good reason for the apparent waste of a valuable commodity.

Notwithstanding all of this agitation and activity directed toward power conservation, we note the sorry spectacle of the Shipping Board taking a backward step by removing from several of its vessels water-tube boilers and geared turbines and substituting therefor Scotch boilers and reciprocating engines. This leads us to remark that now, as in every period of the history of modern engineering, the greatest enemy to advancement has been prejudice and obstinacy on the part of operating engineers themselves, and this seems to be true to the greatest extent in our own United States where one would least expect it.

During the first three weeks of October there came considerable general rainfall all over the state of California and an abundant snowfall in the mountains, and while the engineers are still laboring on the problem, the popular demand for its solution has vanished overnight, the power commissioner has rescinded the order for a twenty per cent reduction, and display signs, street lighting, etc., are running full blast; but the industrial managers facing the problem of costs find it necessary to trim at every point in order to compete, and in all probability a great deal of permanent benefit will come to the industries of the Pacific slope through this power-shortage scare.

I shall hope in future correspondence to report substantial progress along some of these lines and perhaps be able to make a few suggestions for the benefit of engineering societies and local sections thereof.

A. J. Dickie.

James Hartness Elected Governor of Vermont by Big Majority

James Hartness, past-president Am.Soc.M.E., ran ahead of the presidential ticket in his election as Governor of Vermont. Harding was accorded a majority of 44,300 and Hartness 47,400. The total vote for Hartness was approximately 65,950 and for Martin, the Democratic candidate for governor, 18,550. As previously explained in these columns, Mr. Hartness conducted his campaign for the gubernatorial nomination on a platform calling for the development of the industries of Vermont, similar to that which has taken place at his home town of Springfield. This has become very much of an industrial center through the local encouragement offered to home talent and home firms.

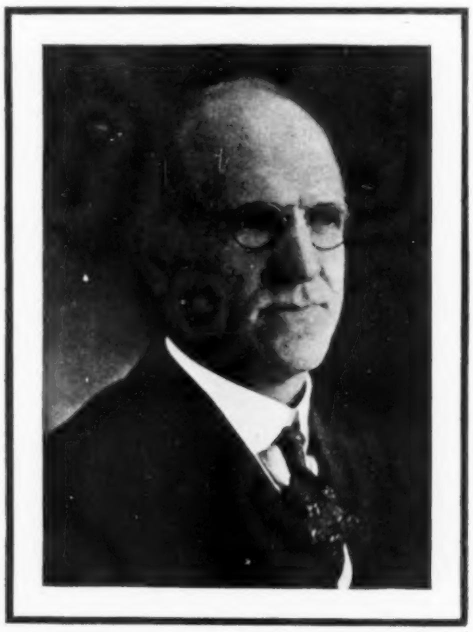
President Burton Inaugurated at University of Michigan

The inauguration of President Marion Leroy Burton at the University of Michigan took place on the morning of October 14. In addition to an address by President Emeritus Hutchins and President Burton's inaugural address, there were others on the functions of the governing board and the faculty in the administration of a university.

President Burton's inauguration was the occasion for an educational conference which was opened on the afternoon of October 14 by a session devoted to a symposium on educational readjustments. The conference continued on October 15 with symposiums on administrative problems and on constructive measures. There were four speakers at each of these symposiums and many problems of the present-day university were discussed. The conference closed on October 16 with a meeting of the regents of state universities at which the salary problem and student fees and tuition charges were discussed.

JOHN R. ALLEN

JOHN R. ALLEN, director of the Bureau of Research of the American Society of Heating and Ventilating Engineers in coöperation with the U. S. Bureau of Mines, and vice-president of The American Society of Mechanical Engineers, died on October 26 of pneumonia. Professor Allen contracted a cold when in Detroit to give an address early in October. He recovered from this and went on to Philadelphia where he spoke for an hour and a half the evening of October 14. The next day, Friday, he attended the A.S.M.E. Council meeting in New York and on Saturday participated in a conference on the ventilation of the New York-New Jersey Vehicular Tunnel. He arrived home early Sunday morning feeling very ill and went immediately to bed. Toward evening he was again about for a little while, and for the last time. Pneumonia had set in. He died on Tuesday afternoon, October 26. Funeral services were held in the First Baptist Church of Ann Arbor, on Friday, October 29, at which the Society was represented by Dean M. E. Cooley and Prof. H. C. Anderson, appointed honorary vice-presidents by President Miller to attend the funeral.



JOHN R. ALLEN

Professor Allen was born in Milwaukee on July 23, 1869, and received his preparatory education at Milwaukee and at the Ann Arbor, Mich., high school. In 1892 he was graduated from the University of Michigan with the degree of B.S. (M.E.), receiving his master's degree from the same institution in 1896. For two years he was connected with the L. K. Comstock Construction Co. From 1896 to 1911 he was associated with the University of Michigan, rising from an instructorship to a full professorship. In 1912 he was called to Robert College in Constantinople, Turkey, as dean of the engineering department. Two years later he returned to the University of Michigan as head of the mechanical engineering department, being so connected until 1917, when he became dean of the college of engineering and architecture of the University of Minnesota. In August 1919 Professor Allen accepted the directorship of the Bureau of Research of the American Society of Heating and Ventilating Engineers, with headquarters at the U. S. Bureau of Mines, Pittsburgh.

Professor Allen was extremely active in the work of engineering societies, having been a past-president of the American Society of Heating and Ventilating Engineers and of the Michigan Engineering Society. He was an honorary member of the National District Heating Association, a member of the British Institute of Heating and Ventilating Engineers and of the Society for the Promotion of Engineering Education. He was also a member of the honorary societies, Tau Beta Pi and Sigma Psi. He became a member of our Society in 1894, and at the time of his death held the office of vice-president of the Society.

Professor Allen has been a contributor of important technical papers to these societies, papers which have proved to be reference works of great value. He was the author of textbooks, not only on the subject of steam engines, which he taught, but also on heating and ventilation. His book on the latter subject is recognized throughout the country as a standard. His long connection with the University of Michigan gave him a wide acquaintance and he was called for consulting work to all parts of the world. Notable among his engineering activities during the period of his connection with the University of Michigan were his expeditions to the unexplored districts of western Mexico to report upon the existence of rubber-producing trees; to the Rocky Mountains to report on water-power projects, and his engineering expeditions into northern Michigan and southern Canada.

A great lover of outdoor life, Professor Allen was the owner of two beautiful farms in the outskirts of Ann Arbor, one of which was owned jointly with his adopted son. He brought the boy back with him from his Mexican expedition and adopted him that he might have the opportunity of coming to this country and of being educated here. This boy, who is a native Mexican Indian, has of late years operated both farms, and it was Professor Allen's great pleasure to spend much of his leisure time in farming.

He leaves a wife and daughter residing in Pittsburgh, his daughter attending the Margaret Morrison school of Carnegie Institute.

WORDS OF APPRECIATION

From Dean M. E. Cooley, a very close friend of Professor Allen's, comes the following appreciation:

Prof. John R. Allen's death was untimely. It came in the midst of his most important life work, apart from his teaching days. He was intensely interested in his heating and ventilating researches, and was trying to establish fundamental laws governing the flow of heat under a variety of practical conditions. A number of colleges were coöperating with him. A year or two more would have seen certain benchmarks firmly established. His death was indeed untimely.

Professor Allen was a man of charming personality. He had a host of friends. In the honor Society of Michigamua here at Michigan his Indian name was "Man of Many Friends." He sat in well at committee meetings and conferences. Always careful of the feelings of others and respectful, difficult situations were overcome and his own views, even when radically different, were well received. He took advice well and was himself a good adviser. He was a splendid teacher. His students respected and admired him. He was a good influence on the young men who sat under him. He was one about whom the older alumni inquired years after their college days. That fact alone marked him with especial honor in the teaching world.

Professor Allen was a well-poised man. Unpleasant things did not upset him. He never lost his temper. His rule was to forget unpleasant things—at least to ignore them. If he could not get away from them in one locality he would move to another. Nothing seemed to ruffle him. At least he did not show it. And yet he was sensitive and easily hurt, but always ready to forgive and start over again.

Professor Allen was resourceful and adaptable. He got on well. In foreign countries he had the same respect and devotion from those with whom he came into contact as at home. He was quick to learn the peculiarities of men and to act accordingly. Rarely did anyone get the better of him for long. His construction gangs frequently embraced Italians, Greeks, Turks, Bulgarians, Armenians. But whatever their nationality, men would work for him cheerfully and well.

Professor Allen loved companionship. He enjoyed his friends and could not do too much for them. He was a good banqueter and could always be relied on for some post-prandial remarks. He enjoyed speaking in public and was more than generous in responding to invitations to address gatherings. His experiences in Mexico when investigating rubber-producing trees, and in Turkey, were favorite non-technical subjects and he made them very attractive with his lantern slides.

The following letter has been received from Prof. O. P. Hood, chief mechanical engineer of the U. S. Bureau of Mines, Washington:

Wherever John Allen made contact with people or work, there will be a keen sense of loss at his going.

Dean Allen came to Pittsburgh in a scientific adventure, the coöperative agreement between the American Society of Heating and Ventilating Engineers and the Bureau of Mines being new and untried as a method of furthering science and technology. His selection to head the work proved so happy that the Bureau had no fears whatever for the character of the output. He dropped into the organization with the greatest accommodation, fitting himself to the situation so graciously as to win instant appreciation from all the members of the Bureau of Mines with whom he was brought in contact. Kindly and helpful in every situation, he was a stimulus to good work. The installation of equipment was just being completed and we all looked forward to an early output of valuable information.

The sense of personal loss to members of the Bureau will be slow to fade.

Fortieth Anniversary Meeting of A.S.M.E.

Special Meeting in New York with Addresses on the Opportunity and Responsibility of the Engineer by J. Herbert Case, Federal Reserve Bank of New York, Samuel Gompers, and William B. Dickson

THE special meeting of The American Society of Mechanical Engineers called to celebrate the Fortieth Anniversary of the first meeting of the Society was held in the Engineering Societies Building, New York, on the evening of November 5. Coincident with this general meeting were meetings in different parts of the country of 32 of the 38 sections, all of which contributed to a most appropriate recognition of the growth of the Society, its far-reaching influence and its long period of service.

As a means for "tying-in" the various meetings the plan was carried out at the suggestion of one of the members, Mr. William H. Bristol, of Waterbury, Conn., of having phonographic records made of speeches by officers of the Society to be distributed to the different Sections for use on the evening of the celebration. Mr. Bristol has been working on a device for synchronizing phonograph records and moving-picture films, and in fact has so far perfected the method that a demonstration with films and records was made at Waterbury before the Section meeting there, which was the first public exhibition of the synchronizing device. The records distributed were of addresses by President F. J. Miller and Past-President I. N. Hollis.

Another tying-in feature was effected through the coöperation of the American Radio and Research Corporation, at Medford, Mass. and its vice-president, Mr. H. J. Power. Greetings from Harding and Coolidge, Mayor Peters of Boston, the Boston Section, Dean Anthony of Tufts College, and the company, were radiophoned to Local Sections throughout New England and as far as Ontario, Canada. President-Elect Harding sent "Greetings and good wishes to The American Society of Mechanical Engineers on the occasion of the celebration of the fortieth anniversary of the organization. The Administration which comes into power next March fourth very much wishes the advice and coöperation of the membership."

The meeting in New York was on the subject of The Opportunities and Responsibilities of the Engineer, with a program arranged by a special committee appointed by the President, consisting of Henry R. Towne, past-president, chairman; Harry A. Hopf, vice-chairman; W. Herman Greul, secretary; William H. Wiley, treasurer of the Society; Frank T. Chapman, representative of the New York Section; and L. B. McMillan, representative of the Committee on Meetings and Program.

The program consisted of preliminary remarks by Henry Towne, the oldest past-president of the Society; A. P. Davis, president A.S.C.E.; William L. Saunders, past-president, A.I.M.E.; and Charles F. Scott, past-president, A.I.E.E. Following these were the three principal addresses: by J. Herbert Case, acting governor, Federal Reserve Bank of New York; Samuel Gompers, president, American Federation of Labor; and William B. Dickson, steel manufacturer. Extended abstracts of these addresses conclude this report.

President Miller presided and said that forty years ago the first regular meeting of the Society was held at the theater of the Union League Club, then at 26th Street and Madison Square. At that time there were enrolled on the books of the Society 189 members and 85 of them were registered as having been in attendance at that first meeting. Continuing, he said:

When a man reaches his fortieth year, he is generally conceded to have reached the zenith of his power of production; but there is no age limit on associations of men—societies of men may be afflicted with some things analogous to old-age infirmities, but when they come they are usually the result either of a lessening opportunity for rendering service, by change of conditions, or by reason of bad management in the affairs of the societies. Our opportunities for service seem to be expanding, and in so far as we can see, they appear to have no limit. With our Local Sections now numbering 38, scattered over the industrial centers of the country, with our student branches now numbering 53, located in the educational institutions at which engineering is taught; with our recently formed Professional Sections now numbering eleven, our participation in the United Engineering Foundation, and in the American Engineering Standards Committee, and in the conduct of our Journal, to mention only the major lines of activity in which the Society is engaged, it can be seen that we are a very active Society.

Remarks by Representatives of the Four Founder Societies

Remarks of Henry R. Towne

Mr. Towne's remarks consisted chiefly of reminiscences of the history of the Society. He said, in part:

I became a member of this Society in 1882, about two years after its organization. The first meeting which I attended was held in October 1883, under the presidency of Mr. Leavitt, in what was then the house of the American Society of Civil Engineers in East 23d Street, which the older members will remember, and we had at that meeting an attendance of about 150. The total membership of the Society at that time was about 600.

Today, to make the contrast at once, the Society has a membership of 13,500, and is still going strong, and the attendance at its meetings approximates thousands where formerly it was only in the hundreds. In the same connection I may mention the fact that the income of the Society in that year was some $7560, whereas its budget for the coming year, I understand, approximates a half million of dollars.

That meeting was signalized also by the evening session of the second day which was devoted to memorial services for one of the most distinguished American engineers and one who is held in affectionate remembrance by all who knew him—Alexander Lyman Holley. The presiding officer on that occasion was Prof. R. H. Thurston, the orator was Dr. Rossiter W. Raymond, and the mover of the final resolution was Mr. James C. Baylis, names familiar to all the older members.

In that connection I may recall that my predecessors, seven of them, were Prof. R. H. Thurston, the first president, followed by E. D. Leavitt, Prof. John E. Sweet, J. F. Holloway, Coleman Sellers, George H. Babcock, and Horace See, all of whom have joined the great majority.

At the meeting of the Society held in Chicago in 1886, owing to the absence of the President, Mr. Coleman Sellers, because of his unfortunate incapacity due to a very serious operation, I, being the senior available vice-president, was called to serve in his place. At that meeting I had the honor of presenting a paper under the title The Engineer as an Economist, and I believe those who are interested in and familiar with the record of this branch of our professional work credit that paper with being the earliest publication of any kind, in the English language, certainly, to propose that the mechanical engineer in his organized society should take up the study of economics as related to his work, the justification for that being, in the case of our Society, in particular, the fact that probably a majority of mechanical engineers are identified more or less closely with managerial positions, as superintendents or directors of industrial operations. I had noted at that time that there was a gathering volume of data and information and experience in that important field, but no channel for its continuation, for its diffusion, and for its utilization, no channel either of printing or of meetings for discussion.

I thought, also, that it marked the dawn of a new science, and that The American Society of Mechanical Engineers, more fittingly than any other organization, could sponsor the growth and development of that science. The suggestion was accepted, the Society has acted upon it from that time to this, and the result has been a great and growing volume of material relating to that subject in our discussions, and in our transactions and public papers.

Now, that fact is directly germane to the program for this evening on the subject of The Opportunities and the Responsibilities of the Engineer. In my opinion, the responsibilities of the engineer have become very definite and his opportunities are almost limitless. Mechanical engineers in particular, who are brought so directly in contact with productive operations, have a great opportunity and an equally great responsibility to see that they do their full share in promoting the advance of the new era and the new conditions which it implies and to which it has given origin.

These new conditions are divided under two heads and can be summed up perhaps in two words: efficiency and coöperation. Efficiency of methods of machines and of processes; and coöperation between those who plan and direct the machinery of industry and those who operate it. The old order is passing. Especially is that true in our method of compensation, the compensation for labor. The old methods have served their purpose fairly well, but they are not adapted to present conditions—they are going to be superseded by newer and I believe by better methods. We will be called upon to meet a great diversity of conditions in the different industries, and these in turn must be worked out by the collaboration of the industrial engineer, and the labor leader. By coöperation between these two elements the problems which will confront us will be solved, and we are going to have greater efficiency, greater productiveness, and there is no greater thing in the world today than that, and with it will come greater possibilities of friendship and good will.

Remarks of A. P. Davis

Mr. A. P. Davis extended the congratulations of the American Society of Civil Engineers to The American Society of Mechanical

Engineers on the completion of its fortieth successful year of operation. He congratulated the Society not only upon its age and upon its growth, but on its activity and its progressiveness. In this connection he said:

I had the honor of being called on by your President recently to dictate a brief greeting to be read at the meetings of the Local Sections of this Society on this occasion, the 40th anniversary of the organization of the parent society, and in that greeting I was glad to state that the usefulness and progressive character of The American Society of Mechanical Engineers was a bright example to be followed and emulated by the older, but smaller and less progressive—though I hope not less useful—organization, the American Society of Civil Engineers.

The American Society of Civil Engineers is now nearing the culmination of an effort to shake off the lethargy of the past, and to become a worthy member of what is known as the Four Founder Societies. The ballot will be opened and counted on next Monday, and on that day we hope that the American Society of Civil Engineers will seal the bond of fellowship with the other three Founder Societies which have entered upon a larger and more useful field than they have occupied heretofore, in joining and leading and forming and molding a federation of all the engineers of the United States into one great Federation, which can work together and be really and truly representative of all the engineers of the country, and speak for them as a body.

Mr. Davis pointed out the opportunities for expansion of engineering activities, referring to the developments resulting from the World War and concluded by saying:

Among those leaders of thought I place foremost the engineers of the world, the educated, experienced men, whose capacity has been demonstrated in the last few years; and whether or not that influence is to be for good or for evil depends on the activity of the people I see before me, and those corresponding to them in the other Founder Societies.

Address of W. L. Saunders

Mr. Saunders, representing the American Institute of Mining and Metallurgical Engineers, discussed four points regarding engineers. These points are given briefly in the following abstract of his remarks:

I occupy a rather difficult position tonight, in that I am expected to represent Mr. Hoover, but I take pleasure in the thought that the man I represent is particularly representative of the subject which called us together tonight—the engineer, not specifically in his technical work, but in his usefulness to society in general.

There are certain thoughts which I should like you to carry away with you tonight, and the first one which impresses itself upon me is this—that the engineer is moving upward and broadening his influence. When I sit on this platform and look at my old friend Samuel Gompers and see him coöperating with us in a meeting of this kind, I rejoice in the knowledge that the profession to which I belong is now one which recognizes the human side of industry, which recognizes, as ex-Mayor Seth Low once said, that a man should have the right to have something to say about the conditions under which he spends the major portion of his life. The second thought which occurs to me, which is closely allied with the first, is emphasized in the fact that this meeting is not merely an experience meeting, not merely a meeting of men and women who have come together to say "We are now forty years old, let us talk about the great things we have done in the past—let us be reminiscent," but it is a meeting to call serious attention to the fact that this forty years of service of engineers brings upon our shoulders greater responsibilities and duties for the future. Let us not forget that, because we have done things in the past in engineering lines, because we have build up this country as a great industrial nation, we have now to face the responsibility of seeing to it that the engineer not only maintains what he has built up, but that he carries it to greater usefulness.

The third thought which impressed me tonight is this: Mechanical engineering is the basic science of all engineering. And the fourth and last thought that I should like you to carry away with you tonight is that these organizations of engineers, the four Founder Societies, and particularly the mechanicals, represent the spirit of coöperation—the spirit of collectivism as distinguished from the spirit of individualism. By getting together, as these societies do, and matching ideas and doing teamwork, they get results, not only for the societies and for the concerns they may represent, but for each individual. It is teamwork which tells.

Remarks by Charles F. Scott

Mr. Scott, who was chairman of the committee which had charge of the construction of the Engineering Societies Building, spoke of the services rendered by Mr. Calvin W. Rice, Secretary of The American Society of Mechanical Engineers, whose activities eighteen years ago as chairman of a prior building committee, made this building possible.

Reviewing the achievements of the past forty years, Mr. Scott said:

During this forty years the population of the United States has doubled; the value of the manufactured products of the country have been increased sixfold; the amount of power which is used in manufacturing, twelvefold; our railway traffic, as measured in ton-miles of freight carried, tenfold. During this same period of forty years other increases have been even greater, for the use of electricity has increased from meager beginnings to the gigantic position, which it now holds. The telephone—the high-speed tool of modern business—has increased from its comparatively small beginnings until now there is a telephone for every ten persons in the United States, and the increase in the number of engineers is typified by the growth of The American Society of Mechanical Engineers, from less than 200, at the beginning, to more than 13,000 at the present time. I understand that the increase in membership during this past year has equalled the total membership at the end of the first twelve years.

While the population has been doubling, the fundamental activities of engineering production and transportation and communication have increased fivefold, tenfold, one-hundred fold. The annual increment is as great as the total a decade or a score of years ago.

Life today is different from that of our grandfathers, because of the things which engineering has supplied. Relationships are different, and so families and communities are no longer free and independent and self-supporting. The factory and the railroad have made us interdependent for food and clothing, fuel and shelter, and health and pleasure.

Nations are no longer isolated and apart. Steam and electricity have cast aside the barriers of space and time. The whole world today is no longer the original thirteen states when measured in time of travel or facility for the transport of food and materials. This new interdependence of communities or nations is based upon the methods of industrial production, and of transportation and communication which the engineer has developed, and which he alone understands and can efficiently operate. From these have arisen new customs; the standard of living has been elevated; new ideals and aspirations have been awakened and new possibilities for benefiting or harming others have been placed in the hands of small groups of men.

As a result of all this, what are the responsibilities of the engineer? The engineer has responsibilities because he has produced power and has applied it to transportation and industry and because this has given the world new activities and capabilities for doing things on a gigantic scale that have changed the whole character of civilization. He has ushered in a new epoch and it is his responsibility to see that this great mechanism which underlies modern society is kept moving and that the tremendous forces which he has produced are not diverted to its destruction.

What are the opportunities of the engineer? It is his opportunity to extend and multiply the means of production and transportation which have already transformed our mode of life. It is his opportunity to coördinate on a larger and larger scale the engineering activities which have grown up independently. It is his opportunity to coördinate in national scope interests which are separate and overlapping and duplicating. It is his opportunity to apply the principles of physical efficiency to human action. It is the opportunity of the engineer to be a leader in pointing out the direction of future development and to direct the trend of human activities along the paths of the highest ideals. The modern engineer is the director of the human as well as the material and inanimate. He determines the abilities of men as well as the qualities of materials.

Nearly forty years ago David A. Wells wrote that the economic changes due to the introduction of the steam engine and machinery brought about the world-wide depression and panic of 1873. But those changes were small compared with those of recent years. Readjustment to the new order of things which engineering and power are producing in modern life —in industry and social and material affairs—will be far-reaching. It will involve evolution, possibly revolution. The problems are many and complex. But to the engineer a problem is an opportunity.

In the course of the evening President Miller read congratulatory messages from President-Elect Harding, Governor Coolidge, Hon. Andrew J. Peters, Mayor of Boston, Herbert Hoover, E. A. Carman, President-elect of the A.S.M.E., the American Engineers in Cuba and the Institution of Civil Engineers of London. Greetings were also sent by a number of the Sections of the Society and by absent members. Mr. W. H. Patchell, a member of the Council of the Institution of Mechanical Engineers of London, was present and read a cablegram from that Institution.

Addresses by J. Herbert Case, Samuel Gompers, and William B. Dickson

Address by J. Herbert Case

The Constitution of your Federated American Engineering Societies defines your profession "as the science of controlling the forces and of utilizing the materials of nature for the benefit of man." I should like you to think of banking as a profession with essentially similar aims. I conceive that our professions and our functions are not vitally different.

More and more the banker is becoming, in a sense, a financial engineer, and adopting essential engineering methods. I have hopes that in the future we shall be able to deal with banking and financial problems as concretely and with the same sureness and knowledge as the mechanical or electrical engineer does now with his problems.

Ever since the banks took on the function of loaning money, this has been the intent. The mechanical engineer wishes first of all to know the strength of his materials. So, in a way, does the banker. But I think we are presently to go much further than this. The banker of the future will

have a variety and definiteness of knowledge that the bankers of the past have not had. Moreover, he will endeavor to do exactly what the engineer endeavors to do in calculating the weight and size of his constructions. He will have to do with stresses and strains and the means of meeting them so that there shall be no breakage and the least possible friction.

It has been the endeavor of more than a generation of thoughtful bankers and economists to devise a banking system which would meet periodic strains so that acute commercial or financial crises might be avoided, exactly as the engineer, for example, plans a bridge to meet every possible strain that can be put upon it, an unusually heavy load, a freshet, an unexpected hurricane, the ordinary dangers of fire and water. I think this endeavor has been successful.

We have witnessed in the past few years a remarkable expansion in credits and during recent months a very remarkable fall in prices. I am not sure that it is not the most remarkable fall in prices, taken as a whole, of which we have any accurate record.

Without wishing to exaggerate the fact, it is easy to see that these prices declines in commodities, whose annual worth runs into the billions of dollars, must in the aggregate have represented an enormous sum. What I wish to point out to you is that all this has taken place without any violent rupture or breakdown, such as has often characterized the past. And I want you to consider the reason why.

The reason why, as I see it, is that, taking a leaf from the basic principles of engineering, there has been introduced into our banking and financial system a greatly augmented factor of safety. We have approximately 10,000 of these banks, representing 70 per cent of America's banking assets, welded together into a coherent and smoothly working system wherein, practically speaking, the resources of these 10,000 banks are more or less pooled, within reasonable limits, and in such a way as to enable them to meet almost any probable strain. Although these 10,000 banks are a trifle less than one-third of the total number, their resources are more than two-thirds of the total banking resources of the nation. Their aggregate deposits are in excess of 20 billions, a fabulous sum even in these days. It is to my mind unthinkable that with 10,000 banks possessing such resources as these, welded together, and pooling their reserves, there can be such a breakdown of our banking system as has come in the past.

My vision goes even further than this. I see our whole banking and financial and currency systems so coördinated and so delicately adjusted to the demands of business that even severe commercial crises shall likewise be largely avoided. I foresee these systems so highly adapted, so well planned, that they will run on almost automatically. I can see our Federal Reserve System and the currency system that goes with it so developed that when the peace of business gets a little too fast, when American enthusiasm gets out of bounds, when the spell of mak ng money rapidly gets the better of men's judgment, this system will almost automatically apply the brakes. And it will apply them, as I imagine, in time, so that perhaps the very high interest rates which we have at the present will no longer be needed. Perhaps some day a general rise in prices will automatically put a check upon credit expansion. It is conceivable that if we should have had a smooth-acting governor automatically controlling our credit policies, the very rapid rise in prices last year might have been in part, at least, avoided and consequently the quite drastic declines that we are witnessing now.

If, in our financial system, we can get a thorough-going introduction of engineering methods, adapted, of course, to financial and banking problems, I foresee a day when these periods of distress will be nearly if not completely eliminated. And I can see that this will do much more. If we can do away entirely with uninvited unemployment; if we can keep the vast industrial machine running like a wonderful Curtis turbine, day in and day out, year in and year out; if we can get rid of these recurrent times of rising prices which affect so severely the cost of living and breed every kind of friction and irritation and discontent; and if, at the same time, we can get rid of periods of business depression; it seems to me that we ought to do away very largely with the prevalent social disturbances, unrest, and insatiate impulse to try impossible schemes of social betterment.

It ought to be pretty clearly evident that a man on an island can eat and have no more than he reaps and makes. What is true of the man on the island is equally true of a nation of a hundred millions, or of the whole wide world. Throughout the last half century the supply of goods, the total of products in this country, has increased at a rate very close to $4^1/_2$ per cent per annum. Our business crises and depressions have been very largely price cycles—if you like, very largely psychological. The vast business of production has gone on pretty much the same. This is the real foundation, I think, for the hope that the financial and banking engineer of the future may so adjust the credit machine that even these price waves and fluctuations, with their attendant dislocations and disasters, may be largely ironed out.

In brief, gentlemen, I feel that the future is full of the richest sort of promise, financial and social as well as industrial. On the engineering side you have done a great and far-reaching work. You have given American engineers and American engineering the highest place in the world. You have set a wonderful, and, I may say, a difficult example to follow. What I wish you to know is that much the same ideas, much the same aims and methods, are at work now in the development of the Federal Reserve System of the United States.

Address by Samuel Gompers

Because of my high conception of the engineering profession I was glad to accept your invitation to address The American Society of Mechanical Engineers to voice my understanding of the possibilities of your work as engineers of industry, and to suggest what seems to me the responsibility of the engineer to the whole modern industrial system.

One of the difficulties that arises nowadays about our discussion of responsibility is that we fail to realize that professional men, whether doctors, lawyers or engineers, should all be in a very real sense, agents of society and not merely masters in their own particular professions.

We are beginning to realize that just as no nation is isolated from the family of nations, so is it actually true that individually we cannot be isolated from our professions. Every man in his actions, influences in a greater or less degree, other groups or individuals, either for good or evil.

During the past few months engineers have expressed their sense of responsibility in a splendidly stimulating way. In order to accomplish better their purpose of service to others and to contribute to public welfare the best that was in them, all the engineering and technical societies of the United States banded themselves together in a great over-arching organization designated as The Federated American Engineering Societies—a comprehensive organization dedicated to the service of the community, state and nation. This close union makes possible coördination of effort and more efficient progress in achievement of great ideals.

During the past year representatives of engineering organizations as well as individual engineers have come to me, seeking help in getting a better understanding of the human element essential to production and in establishing the proper basis for coöperation with the constructive force which they had come to realize exists in the organizations of human beings engaged in industrial production. For the engineer knows that organization is necessary in order to utilize power—human or material.

It is a tremendously encouraging fact that the engineers throughout the country are coming to appreciate their high calling. It is unnecessary for me to review the mechanical achievements of the engineer, for they speak for themselves, but I do want to point out that concept which has grown up in industry, which many accept, is fundamentally in error. We talk about the production of our factories as being the material, the finished product, in other words, which is sent out in freight cars, and of the individual workmen as by-products. Men, not things, are the true goal of civilization. That civilization fails that does not produce great men and great women, able to create and to use with discrement the material things that serve the spirit. Who can estimate the worth of human beings? I submit that the true ethical point of view of production is that the man himself is the main product and the materials the by-product, and it is in this clearer point of view, it seems to me, the way lies open for joining the forces which the labor movement represents and the forces represented by the activities of your own societies.

The problem involved is not a simple one, for the tendency during the last seventy-five or one hundred years of our western civilization has been to have the machine replace the man. The old feeling of craftsmanship, which existed before the industrial revolution came about, has been greatly modified because of the perfection reached in machine design. This process, however, has been carried entirely too far, for in many places the man has become a human connecting link in a machine and mastered by it instead of controlling the machine himself, as he did with the tools that he used in the old days. The result is that today men's work tends to become mere toil, so it seems to me that the task that lies before us is to develop a definite kind of working environment which will be attractive and which will inspire rather than repulse the workmen. The work itself must become of central concern. This cannot be brought about unless the man finds the opportunity for self-expression in the day's work and a chance to exercise his creative impulses.

During the past 50 years the labor movement has endeavored to protect the workman against the inroads of the machine upon his own life. Our fundamental effort toward this may be epitomized in this declaration. The labor of a human being is not a commodity nor article of commerce. We knew that human labor is inseparable from thinking, living beings, but it took the organized power of our labor organizations to secure recognition of this principle in law and in practice. Workmen's compensation laws and other legislation of a similar nature are a recognition of this fundamental.

I see, however, before the labor movement a great future, as I also see a great future before the engineering profession. If the engineer should join hands with the workman—both devoting their energies to one cause, namely, the development of a kind of industry and a kind of work in which the man will not only learn the processes of production—each day will have increasing opportunities to develop those human functions which are essentially intelligent.

A way has been opened for such coöperation in the declarations of the conventions of the American Federation of Labor, expressing appreciation of the value of the technicians of industry and the desirability of the labor movement's availing itself of scientific aid in all possible ways.

In America our education has been both popular and free. We have had compulsory education for all because we wanted to be sure that all would be prepared for the duties of citizenship. Education, however, is nothing more than the acquiring of greater knowledge of natural law and an opportunity to use this knowledge in the performance of useful work. Is it not logical, therefore, to look forward to the day when our industries will be conducted along educational lines?

It is the deadly monotony of repetitive work that is at the root of most of our troubles, and I, therefore, in the name of the workers, urge you engineers to direct your energies to the solution of this problem. Beware that the machines you create do not become a Frankenstein and enslave the human race.

If you study the laws of humanity with the same degree of intensity that you study the laws of material science, you will render a tremendous service, and as President of the American Federation of Labor it is my firm con-

viction that the labor movement not only welcomes but invites your coöperation.

Address by William B. Dickson

After a brief introductory statement, Mr. Dickson analyzed the present showing of signs of instability in the social order. Mechanical developments, which during the past two or three generations have advanced the human race, may nevertheless bring about grave dangers, which must be recognized and counteracted if American ideals are to be preserved.

Mr. Dickson spoke of the danger to be apprehended from a high degree of specialization in modern industry and drew a vivid picture of the artisan, happy in the opportunity for the expression of his creative instinct.

In Mr. Dickson's opinion, the menace of people clothed with political power but stunted in body and soul by their industrial environment presents a problem which will need the most careful consideration by the industrial leader.

Mr. Dickson then proceeded as follows:

The principal theme, however, to which I wish to direct your attention is this: What is the supreme issue confronting mankind today? In my opinion, simply the same issue which runs back through all history, and which we have fondly dreamed was settled once and forever by the American people, namely, aristocracy vs. democracy.

We Americans are so accustomed to think of democracy as the normal system of human government, the very flower of civilization, that the man in our midst who would seriously question this apparently self-evident truth would be looked upon as abnormal, to say the least. We fondly hoped that when Cornwallis surrendered at Yorktown political democracy was achieved. As a matter of fact, democracy is not an achievement; it is an opportunity for further struggle upward.

We must now set our minds to the task of applying democratic principles to industrial relations. I believe there is a grave menace to our American ideals in the highly centralized, autocrati control which is becoming a marked tendency in our great industries. The tendency of our modern industrial system is toward autocratic control of the workers through ownership of what our socialistic friends term "the tools of production," which include not only the natural resources, but also the furnaces, mills, factories and transportation systems.

Instead of indulging in glittering generalities, let me cite an instance of what has happened under the existing system of corporate control. Some years ago, a gentleman at the head of one of our great corporations decided that prices must be maintained in the face of a diminishing demand. In order to accomplish his purpose, he restricted production by shutting down a number of large plants located in different communities, each of which had been built up largely as an adjunct of the plant. Some of these plants were kept closed for about a year, and the result was disaster to the communities. The merchants were driven out of business, real-estate values were depreciated, and the workers were thrown on their own resources and had to break up their homes and seek employment elsewhere. None of these persons had any voice in the momentous decision which was made in a New York office, and which resulted in social paralysis in all of these communities.

History is filled with instances where centralized power has led to conditions inimical to human progress, as that term is usually understood in America. It is the effect of the unconscious insolence of conscious power. If we should read in the paper some morning that a Turkish pasha had exercised his authority in such a way as to deprive a city of its means of subsistence, we would raise our eyes in holy horror and bless our good fortune in living in a more enlightened land. Any manifestation of autocracy is repugnant to the American people, whether it proceeds from a president of a corporation, a president of a labor union, or a president of the United States. What is the answer? Only one, namely, industrial democracy.

In a great national crisis, Lincoln said, "A house divided against itself cannot stand;" "this nation cannot continue to exist half slave and half free." I believe that we are approaching a time when we will need an industrial Lincoln, who will give utterance to the creed of the twentieth century; "A house divided against itself cannot stand; this nation cannot continue to exist politically democratic but economically autocratic." What do I mean by Industrial Democracy? It is exceedingly important that there be no confusion as to this definition. Mr. Carnegie was once asked, "Which is the most important factor in your business, capital, management, or labor?" He replied, "Which is the most important leg on a three-legged stool?" This answer epitomizes my theme, and also what I believe will be the creed of the twentieth century.

In an efficient partnership, such as Mr. Carnegie's answer implied, while each partner may have equal rights, the duties and responsibilities are usually separated so that each exercises his principal functions within his own limited sphere. But where grave questions are to be considered, which vitally affect the organization as a whole, there is general consultation. So, in the new ideal of industrialism, each factor, i.e., capital, management and labor, will continue to have its own separate natural function, as heretofore, but no arbitrary, autocratic decisions affecting the general welfare will be made, either by the directors, the officials, or by the workmen.

Some of you may ask "Did Mr. Carnegie follow this ideal in practice?" My answer is, "No." He did give a larger measure of recognition to management than most of his fellow-manufacturers, but in his attitude toward labor, he was merely a signpost, pointing the right way but never taking it. The Carnegie labor policy was highly autocratic, as is that of its successor, the U. S. Steel Corporation; a benevolent autocracy, if you please, in many splendid ways, although it still maintains that relic of barbarism, the twleve-hour day. But however large you write the word "benevolent," you must always write after it the word "autocracy." The autocratic policy of this great industrial corporation is diametrically opposed to American ideals, and if it and similar organizations in other industries continue to grow and to maintain this autocratic attitude, there can be only one result—industrial feudalism; feudalism with a high degree of comfort and safety for the worker, I grant you, but none the less, feudalism.

One of the most melancholy tasks of the student of history is to observe the insidious ways in which free institutions have been destroyed under the guise of apparently innocent innovations. Rome, after a glorious history as a republic, extending over nearly five centuries, became an empire under the Caesars, and as far as outward forms were concerned, the transition was so gradual that the citizens did not realize that any real change had occurred. This was so apparent that Julius Caesar himself did not dare to accept the title of king. So today I am not imputing blame to any man or class. No man has deliberately said, even to himself, "I will deprive my fellow-citizens of a large measure of liberty in order to enrich myself," nevertheless the things which lead to this condition have been done, and are being done today as we look on.

As a famous American has said: "The essential characteristic of empire in the objectionable sense, is absolutism. Whether or not absolute power be administered benevolently, makes no difference. The evil is in the power itself, not in the nature or manner of its administrstion.

When a man, or a number of men, for their own ends, create a great industrial unit, they assume an obligation toward the human elements in that unit, and through them to society in general, which cannot be cancelled or suspended arbitrarily. I subscribe to the doctrine that human labor is not a commodity in the ordinary sense of that term. In a completely natural society, every man by reason of close and continuous contact with land and other natural resources would be an independent, self-sustaining unit. When a man has left this natural condition, whether voluntarily or otherwise, and has become the servant of another man, or other men, he has given up a natural right and his employer has assumed an equivalent obligation. The fact that neither the employer nor the employee has been conscious of this exchange, and that both may have acted from purely selfish motives, does not alter the elemental fact, which, in the great national aggregate, constitutes the great unanswered problem of modern times—the elemental fact that is at the base of all social unrest.

I believe that the greatest task to which American employers must address themselves is the devising of practical ways in which labor can be given the full recognition to which, as an equal partner, it is entitled. I make this statement with absolute confidence in the fairmindedness of the American workingman when he is fully informed and is entirely free to act. If I did not have this confidence, I would despair of the future of our free institutions. I believe, therefore, that one of the first steps necessary to inspire the workman with confidence is the sincerity of the employer's recognition of the proper status of labor, in the adoption of a fair system of collective bargaining.

I also believe that in the near future the workmen must become partners through some system of profit-sharing. No scheme could be adopted which would be applicable to all business, as each particular company would have to adopt the general idea to its own particular conditions.

But, some of you may say, "We don't want to have anything to do with your so-called industrial democracy; we are satisfied with the present system and prefer to continue as we are." My answer to this is that the human relations are not static, but dynamic and unless I am entirely mistaken as to the direction and force of the tide which is now running so strongly in human affairs, your choice will not lie between the present system of industrial control and industrial democracy.

American industry has come to the parting of the ways; on the right, is the road that leads direct to industrial democracy. This road has some heavy grades, and a higher degree of skill will be required to drive on it, but it will bring us out into peace Valley. On the left, is a road also deviating from the old road by which we have come, but it is cunningly camouflaged so as to seem to be the natural continuation of the main highway. It leads directly to industrial feudalism; to that social condition predicted by Hilaire Belloc in his book, The Servile State, in which the workers voluntarily sacrifice freedom in return for comfortable maintenance and safety. From this second road, there is also a by-path which is now being trodden by Russia, and toward which not only our British brethren, but a considerable number of American workmen are being tempted to stray. In other words, the choice lies between democracy on one hand, and serfdom or chaos on the other.

To sum up, what can be done to counteract the tendencies which I have described? These things seem to me to be entirely practicable:

1 Place our industries on a more democratic basis giving recognition to management and labor as, equal partners with capital.

2 Teach democracy in our schools and colleges as thoroughly as we teach arithmetic, so that it will permeate every phase of human life, politically and industrially.

It is a constant source of wonder to me to find so many persons in all walks of life who have no real conception of the vital principles of democracy. Life, in its truest and most virile sense consists largely in making choices, and, like the traveler before the Sphinx, we must answer correctly or be destroyed. I am not looking forward to the new era of industrial democracy as a period of peace and serenity, but rather as a time in which the way has been cleared for a further toilsome climb up the spiral of evolution. I am hopeful that our generation will guess the Sphinx riddle, and that "Out of this nettle, danger, will pluck the flower, safety."

Engineering and Industrial Standardization

A Review of Standardization Work Now in Progress, as Reported by the American Engineering Standards Committee

THE American Engineering Standards Committee held its regular quarterly meeting in New York on October 9. Among the more important reports submitted were those from committees on finance, membership, and safety codes. Nomenclature for standards was also discussed, as well as suggestions for standardization in the zinc and other non-ferrous metal industries. Brief notes from the minutes of the meeting follow:

Report of the Finance Committee

The report of the Finance Committee, which had been accepted by the Executive Committee and recommended to the Main Committee for approval of the policies therein outlined, had been circulated to the members prior to the meeting. It was accompanied by detailed estimates prepared by the Secretary under instructions of the Executive Committee. The recommendations, in brief, were: (1) That efforts should be made to secure contributions to increase the total annual income of the Committee to \$25,000, and (2) that associations of manufacturers rather than individuals or corporations be asked for contributions. These recommendations were very fully discussed, and upon motion by Mr. Robinson it was unanimously resolved that, while it is preferable that contributions be received from associations of manufacturers rather than from corporations, it is entirely proper to accept contributions from corporations provided the appeal for such support be broad enough to include a considerable number of widely different interests, and provided no one company be asked for a relatively large contribution.

Report of the Membership Committee

The chairman of the Membership Committee submitted a report recommending favorable action on the applications for membership from the Department of the Interior, the Gas Group, and the American Electric Railway Association. Upon motion by Mr. Latey, it was resolved that the Department of the Interior be admitted to membership with three representatives; that the Gas Group (comprising, at present, the American Gas Association, the Compressed Gas Manufacturers Association, the International Acetylene Association) be admitted to membership with three representatives; and that the American Electric Railway Association be admitted to membership with one representative at the present time, but with the understanding that this may be increased to two or three, if this should later seem advisable. The action in each case was by unanimous vote.

Report of Joint Committee on Safety Codes

A report of the chairman of the Joint Committee on Safety Codes dated October 5 was submitted and the four recommendations contained therein were approved by the following unanimous actions to the effect

(1) That the Bureau of Standards and Society of Automotive Engineers be requested to assume joint sponsorship for an Aviation Safety Code;

(2) That the American Society of Heating and Ventilating Engineers be requested to assume sponsorship for a code on Ventilation;

(3) That the Electrical Safety Conference be designated as sponsor for safety code on Electrical Power Control; and

(4) That in view of the time which has elapsed since the preparation of the 1917 Foundry Safety Code by the American Foundrymen's Association and the National Founders' Association, and of the progress in safety practices in the meantime, that it be suggested to the sponsor bodies that it is desirable to organize a sectional committee to approve or revise this code before it is approved by the American Engineering Standards Committee.

Color Schemes for Pipe Lines

S. J. Williams reported that in accordance with the suggestion of the Executive Committee, The American Society of Mechanical Engineers and the National Safety Council had addressed inquiries to a considerable number of organizations in regard to the desirability of attempting the standardization of color schemes. The answers had all been favorable. Considerable information had already been collected. It was thereupon voted that The American Society of Mechanical Engineers and the National Safety Council be requested to assume joint sponsorship for the standardization of Color Schemes for Pipe Lines.

Nomenclature of Standards

The following action was taken by unanimous vote:

WHEREAS, The terms, "Tentative American Standard" and "Recommended American Practice" more accurately express the meaning intended to be conveyed by the terms "Tentative Standard" and "Recommended Practice," and

WHEREAS, The latter terms conflict with long-established practices of important organizations, be it

Resolved, That the American Engineering Standards Committee will approve standards as either "Recommended American Practice," "Tentative American Standard," or "American Standard," and will authorize the use of these terms in the publication of standards approved by it.

Zinc and Other Non-Ferrous Metals

A communication was received from the Association Belge de Standardization under date of August 31, suggesting international standardization of the following matters pertaining to zinc: grades of spelter, gage thicknesses and tolerances for sheet zinc, methods of weighing and determining moisture content, and methods of analysis of ore and spelter. The Association also suggested that similar work on other non-ferrous metals might follow.

Mr. Stone stated that he had discussed the matter informally with the American Zinc Institute and that the Institute felt that the work proposed on zinc was very desirable. After further discussion, it was unanimously voted that the American Society for Testing Materials and the American Zinc Institute be requested to assume joint sponsorship for the standardization of zinc.

The larger question raised by the Belgian communication of non-ferrous metals in general, was also considered and it was voted that the officers be authorized to call a conference of the bodies which might be interested, to consider whether work on other non-ferrous metals should be undertaken and if so, what the scope of the work should be.

The Standardization of Elevators

Upon the request of the American Institute of Architects and the Elevator Manufacturers' Association of the United States a conference of the various bodies interested in the question of the standardization of elevators was recently called by the American Engineering Standards Committee for the purpose of deciding whether or not such standardization work should be undertaken, and if so, what its scope should be. The conference was held in New York on September 21, and was attended by representatives of the following organizations:

American Institute of Architects
American Institute of Consulting Engineers
American Institute of Electrical Engineers
American Society of Mechanical Engineers
American Society of Safety Engineers
Bureau of Building (Manhattan)
Bureau of Standards
Electric Power Club
Elevator Manufacturers' Association of New York
Elevator Manufacturers' Association of the United States
National Association of Building Owners and Managers
National Fire Protection Association
Supervising Architect's Office, U. S. Treasury Department

After a full discussion of the subject which touched upon such matters as platform sizes, speeds, accelerations, capacities, methods of test, pit and overhead clearances, well dimensions and hatchways, and safety provisions and appliances, it was unanimously

Resolved, That this Conference fully recognizes the need and the desirability of standardizing such features of both passenger and material-handling elevators as capacities, platform sizes, and methods of test.

The relation of the standardization of the fundamental features of elevator to the Elevator Safety Code now being formulated by The American Society of Mechanical Engineers, was also fully considered, and a committee appointed to confer with the Mechanical Engineers and arrange for coöperation in the completion of this code.

The conference also appointed a committee, consisting of one member from each body represented at the meeting, to develop plans for the standardization of elevators. This committee is to report its recommendations to the American Engineering Standards Committee.

Progress of the Safety Code Program

Considerable progress has been made toward the completion of the program calling for the creation of safety codes. This work has been undertaken by a large number of organizations under the auspices and rules of procedure of the American Engineering Standards Committee, and following the regular procedure, each code

is being formulated by a sectional committee, broadly representative of the interests concerned, and composed primarily of representatives designated by the various bodies interested in the particular code. The sectional committee is organized by one or more bodies designated for the purpose by the American Engineering Standards Committee and known as sponsors.

The Head and Eye Protection Code has been completed, and the sponsor, the Bureau of Standards, has submitted the code to the Main Committee for approval. Sponsorships for the additional safety codes have been arranged as follows:

Construction Work. National Safety Council
Electrical Fire Code. National Fire Protection Association
Electrical Safety Code. Bureau of Standards
Floor Openings, Railways and Toe Boards. National Association of Mutual Casualty Companies
Lighting Code. Illuminating Engineering Society
Lightning Protection. American Institute of Electrical Engineers and the Bureau of Standards
Machine Tools. National Machine Tool Builders' Association and the National Workmen's Compensation Service Bureau
Mechanical Transmission of Power. National Workmen's Compensation Service Bureau, the International Association of Industrial Accident Boards and Commissions, and The American Society of Mechanical Engineers
Sanitation Code, Industrial. United States Public Health Service
Stairways, Fire Escapes and Other Exits. National Fire Protection Association
Textiles. National Safety Council and the National Association of Mutual Casualty Companies

Sponsorships Previously Announced

Abrasive Wheels. The Grinding Wheel Manufacturers of the United States and Canada, and the International Association of Industrial Accident Boards and Commissions
Foundries. American Foundrymen's Association and the National Founders' Association
Gas Safety Code. Bureau of Standards and the American Gas Association
Head and Eye Protection. Bureau of Standards
Paper and Pulp Mills. National Safety Council
Power Presses. National Safety Council
Pressure Vessels, Non-Fired. American Society of Mechanical Engineers
Refrigeration, Mechanical. American Society of Refrigerating Engineers
Woodworking Machinery. International Association of Industrial Accident Boards and Commissions and the National Workmen's Compensation Service Bureau

Law for Registration of Engineers

On October 21 the Committee on Licensing Engineers reported to Engineering Council the uniform law for registering architects, engineers and land surveyors. The justification for this law is given in Section 1: "In order to safeguard life, health and property, any person practicing architecture, engineering or land surveying shall be required to submit evidence that he or she is qualified so to practice." The law, as drawn, places no limitations on those who may or may not practice the profession of architecture, engineering or surveying provided they refrain from using the title.

The law specifies in detail the personnel of the Board who shall pass upon the registration of the professions coming under the jurisdiction of the law, providing for apportionment among the professions of architecture, engineering and surveying. All the members of the Board shall be citizens, residents of the state, and members in good standing of recognized professional societies. The Board shall each receive a certificate of appointment from the Governor of the State and a certificate of registration and is then authorized to affix its official seal to certificates of registration granted.

The qualifications for registration are based on a study of the complete statement of the applicant's education and a detailed summary of his technical work. These statements should be made under oath and should be supported by the recommendations of not less than two members of his profession. All applicants to be eligible must be over twenty-five years of age, citizens of the United States or Canada, must speak and write English, must be of good character, and must have been actually engaged for six or more years in architectural, engineering or land-surveying work of a character satisfactory to the Board. A year of teaching or of study satisfactorily completed in a school of satisfactory standing, shall be considered equivalent to one year of active engagement. The functions of the Board are largely administrative and judicial. The burden of presenting evidence of qualifications is placed upon the applicant.

The law states that unless disqualifying evidence be before the Board, the following facts established in the application shall be regarded as prima facie "evidence, satisfactory to the Board," that the applicant is fully qualified to practice architecture, engineering or land surveying:

a Ten or more years of active engagement in architectural, engineering or land surveying work;

b Graduation after a course of not less than four years, in architecture or engineering, from a school or college approved by the Board as of satisfactory standing, and an additional four years of active engagement in architecture, engineering or land-surveying work;

c Full membership in American Institute of Architects, American Institute of Chemical Engineers, American Society of Civil Engineers, American Institute of Electrical Engineers, American Society of Mechanical Engineers, American Institute of Mining and Metallurgical Engineers, Society of Naval Architects and Marine Engineers, or such other national or state architectural or engineering societies as may be approved by the Board, the requirements for full membership of which are not lower than the requirements for full membership in the professional societies or institutes named above.

The Board has the power to revoke certificates of registration if the holder be found guilty of negligence, incompetency or misconduct. The law permits practicing in the state by architects, engineers or land surveyors on a consulting basis, provided the non-resident is qualified for professional service in his or her own state or country.

Corporations are permitted to engage in practice under this law, provided the person or persons connected with such corporations or partnerships, in responsible charge of such practice, is or are registered as herein required as architects, engineers or land surveyors.

The law has been prepared by Engineering Council for an act of legislation in each state. Complete copies of the law may be procured of Alfred D. Flinn, Secretary of Engineering Council, 29 West 39th St., New York City.

Warner and Swasey Observatory Dedicated at Case School of Applied Science

The Case School of Applied Science, Cleveland, Ohio, on October 12, 1920, dedicated a new astronomical observatory, the gift of Worcester R. Warner and Ambrose Swasey, partners in the noted firm of instrument makers. The building is placed on the crest of a ridge overlooking a beautiful residential section of Cleveland, about two miles from the school campus. The plan of the building is L-shaped, with the telescope tower at the angle. One single-story wing is devoted to a library and conference room, at the inward end of which is constructed a constant-temperature room for two Riefler clocks. The other wing contains two astronomical transits, and a zenith telescope, all Warner and Swasey instruments. A basement provides living quarters for the caretaker, a storeroom, a battery room, and a photographic room. In the tower is a 10-in. telescope, the lens of which was ground by John Brashear, of Pittsburgh.

At the exercises Mr. Swasey related many anecdotes of the firm's astronomical work, and Mr. Warner, who for thirty years has been a trustee of Case School of Applied Science, presented the keys of the observatory to President Charles S. Howe, who made an appropriate response. Prof. D. T. Wilson, professor of astronomy at Case, outlined his work and his plans for the future usefulness of the observatory. The principal address was delivered by Director W. W. Campbell, of Lick Observatory, Cal., on the topic, The Daily Influences of Astronomy.

Some applications of astronomy to daily life, Dr. Campbell said, are the following: supplying the world with correct time by observations through transits, determining latitudes and longitudes for maps and navigators, the fixing of boundaries and the predicting of tides.

Power Test Codes

A.S.M.E. Committee on Power Test Codes Submits Preliminary Draft of the First of the Nineteen Test Codes Which It Is Formulating

As has been mentioned a number of times in Mechanical Engineering, The American Society of Mechanical Engineers organized in December 1918 a Committee of 125 specialists to revise the Power Test Codes of 1915. This large Committee is subdivided into a Main Committee of twenty-eight engineers which supervises the work of the nineteen Individual Committees. Each Individual Committee, which is made up of from six to ten men, is revising one particular test code.

The Code which follows is entitled "General Instructions," and as its name indicates, has been formulated for use with each of the test codes.

The Committee will welcome suggestions for corrections or additions. These should be sent to Mr. Fred R. Low, Chairman, before January 1, 1921.

GENERAL INSTRUCTIONS

Object

1 Ascertain the object of the test. This object should be kept in view during preparations for the test and in the conduct of the test itself. The methods to be used and the accuracy sought should be in accord with the object in view.

2 Among the many objects of performance tests, the following may be noted:

- Determination of capacity, efficiency or regulation, and the comparison of these with standard or guaranteed results
- Comparison of different conditions or methods of operation
- Analysis and interpretation of plant performance
- Comparison of different kinds of fuel
- Determination of the effects of changes of design or proportion upon capacity or efficiency

3 If questions of fulfilment of contract are involved there should be a clear understanding in writing between all parties as to the operating conditions which should obtain during the trial, the methods of testing to be followed, corrections to be made in case the conditions actually existing during the test differ from those specified, and as to all other matters about which dispute may arise, unless these are already expressed in the contract itself.

Preparations

4 Ascertain and record manufacturer's serial number, plant designation or other means of identifying each unit involved in the test in order that later there may be no uncertainty as to which unit or units were used in obtaining certain data.

5 Examine and record the general features, arrangement and condition of the apparatus and plant, and, if needed, make sketches to show the arrangement, and any unusual features. When making such examinations operating conditions bearing on the object of the test should be noted. So far as possible examination should be internal as well as external.

6 Determine the principal dimensions of the apparatus to be tested, particular attention being given those bearing on the objects in view. When possible, important dimensions should be determined by actual measurement. When conditions of operation change these dimensions, due allowance should be made therefor.

7 If the object of the test is to determine the highest efficiency or capacity obtainable, any physical defects of operation tending to make the result unfavorable should first be remedied. All fouled parts should be cleaned, the whole being put in first-class condition and evidence that it is in such condition should be secured and recorded. If, on the other hand, the object is to ascertain the performance under existing conditions, no such preparation is required or permissible. If fulfillment of contract is involved changes should not be made in apparatus or operation without the consent of all parties interested.

8 In all tests in which the quantity of gas, vapor or liquid flowing in pipes or ducts is determined or in which such quantity forms an item in calculation of results, precautions, must be taken to guard against leakage. Such precautions are necessary in the case of blow-off connections, drips and drains, cross-connections, isolating valves, packing and joints of all kinds, etc. All outlets and inlets other than those actually required in the test should be blanked off or so arranged that any leakage in or out can be observed. A leakage test to determine tightness and to measure unpreventable leaks should be made in every instance.

Instruments and Testing Apparatus

9 The accompanying main code section headed "Instruments and Testing Apparatus" contains a description of the various instruments and appliances which may be employed for Code tests, together with directions for their application, use and calibration, and a statement of their adaptability and limitations. The choice of instruments and apparatus for any test must be determined by local conditions, adaptability and availability, but in all cases the types called for in the various codes should be used. In making this choice, the degree of accuracy desired should be one of the guiding factors.

10 All instruments and testing apparatus used should have designating numbers or other means of identification firmly attached and such identifications should be entered on the log sheets.

11 All instruments and testing apparatus should be calibrated, and any which may give trouble if not approximately correct and all which may be broken in use should be calibrated in advance. Additional calibrated instruments should be provided to replace any which may be broken during the test. Any instrument which may not maintain its calibration throughout a test should be calibrated before and after the test, and, if necessary, at intervals during its progress.

12 The location and arrangement of instruments and apparatus must be left to the judgment and ingenuity of the person in charge, subject to the directions of the code, the details being largely dependent on the type of apparatus under test, the locality and the facilities available. Instruments and testing apparatus should always be so arranged and installed as to give maximum accessibility and best possible illumination in order to facilitate use.

13 Notebooks or log sheets should be so arranged that all readings of one group of instruments or all readings made byo ne observer appear in one book or on one group of sheets. The pages or sheets upon which entries are to be made should be ruled in advance, should be given proper identification marks, should contain space for the date and the name of the observer and should contain proper headings and subheadings. All such sheets should have at least one column in which time is recorded. When rates are to be determined by differences between observations, a time column should accompany the observation column. Space for remarks should be provided on every sheet.

14 A desk or table from which the tests may be directed and at which the records may be assembled should be provided in tests requiring many observers. This should be located with due regard to the positions they occupy. A signal system or a system of intercommunication is convenient and may be provided.

Miscellaneous Instructions

15 The person in charge of a test should have the aid of a sufficient number of assistants, to permit him to give special attention to any part of the work whenever and wherever it may be required. He should make sure that the instruments and testing apparatus continually give reliable indications, and that the readings are correctly recorded. He should also keep in view, at all points, the operation of the plant or part of the plant under test, and see that the operating conditions determined on are maintained and that nothing occurs to vitiate the data.

Starting Conditions

16 When circumstances permit, it is advisable to make one or more preliminary tests for the purpose of determining the adequacy of the instruments and apparatus and of training the personnel. When conditions do not permit such preparatory runs, operations may be started and the time at which conditions become satisfactory can be chosen later as the starting time of the test.

17 Before the test begins or before continuing the test after an important change of conditions during operation, the apparatus should be run under normal conditions for a sufficient length of time to bring about equilibrium with respect to thermal or other factors, except in cases in which the effects of the variation of such conditions are to be determined or included. These exceptions include such effects as result from starting and stopping, carrying units ready for start, and banking fires.

18 In preparation for a test to demonstrate maximum efficiency, it is desirable to make preliminary tests for the purpose of determining the most advantageous conditions.

Operating Conditions

19 In all tests in which the object is to determine the performance under conditions of maximum efficiency, or where it is desired to ascertain the effect of predetermined conditions of operation, all such conditions which have an appreciable effect upon the efficiency should be maintained as nearly uniform during the trial as the limitations of practical work will permit. On the other hand, if the object of the test is to determine the performance under working conditions, no attempt at uniformity should be made unless this uniformity corresponds to the regular practice, and when this is the object the usual working conditions should prevail throughout the trial.

Records

20 Records of a test are divided into two classes:

(*a*) Records of preliminary examination such as those outlined in Paragraphs 4 to 8 inclusive, and

(*b*) Records of observations made, and events occurring during the test.

21 Records of both classes should be made with an original and a sufficient number of carbon copies so that one copy may be given to each party in interest. All records should be signed by the respective observers and countersigned by the person in charge of the test.

22 A log of the observations made during the test should be entered in the notebooks or on the sheets referred to in Paragraph 13. This should be done in such manner that the test may be divided into suitable periods to show the degree of uniformity attained.

23 The readings of instruments from which averages are to be obtained should be recorded at intervals fixed by the extent of their variations. Ordinarily time intervals of from fifteen to thirty minutes are sufficient, but there are cases in which intervals of less than a minute are necessary on account of rapid and irregular variations.

24 Ordinarily the intervals between readings should be regular, and this is particularly true when readings are to be averaged. There are, however, cases in which the purpose of the test is such that regularity is not required and possibly not even desired. In every case the person in charge must determine the requirements in this respect.

25 It is not always necessary to read all instruments at the same intervals, nor is it always necessary to read simultaneously those which are read at the same intervals. In cases in which the readings of given instruments are averaged, respectively, for a long period and these averages are used in calculating results, regularity rather than the attainment of simultaneous readings should be the guiding principle. In cases in which each set of observations is used for calculating a result and the results are then averaged, simultaneous readings are all-important. When observations are made to determine rates by sums or differences, the exact time of making the observation is necessary. Whenever possible, check readings should be made after observation has been recorded.

26 The records made during the test should show the extent of fluctuation of the various instruments in order that data may be available for determining the effect of such fluctuations on the accuracy of the calculated results.

27 A record should never consist of a series of tallies as is sometimes made when loads of given weight are discharged at odd intervals or under similar repeated conditions. In such cases each weight and the time when taken should be recorded.

28 Observations of basic character in a given test should be made and recorded in duplicate by two observers when the importance of the test warrants such precautions. In order that the readings made by these observers may be in accord before it is too late, the readings should be compared and an agreement reached soon after the observations are made.

29 A running graphical log of the principal quantities recorded during a test should be maintained. Such graphical records serve to call attention to undesirable or unintentional lack of uniformity in the conduct of operations and to detect errors of observation or record before it is too late to correct them. Such graphical logs should be arranged so that time is plotted horizontally and quantities vertically.

30 Every event connected with the progress of a test, however unimportant it may appear at the time, should be recorded on the proper log sheets with the time of occurrence and the name of the observer who noted the event and entered the record.

Working up Data

31 It is desirable to work up the data approximately during the progress of the test. This tends to call attention to omissions and to irregularities of various parts. Calculations of this kind are, however, to be regarded as auxiliary testing methods and the results obtained should not be used in the preparation of the final report unless the test is intended to be of approximate nature and the result to be so given.

32 When all records have been completed and assembled, they should be reviewed for the purpose of determining how they are to be used in obtaining the results of the test. All parts of the record which show evident irregularities must be either corrected or eliminated in order that the final results may not be knowingly in error, and if satisfactory adjustments cannot be made, the test must be repeated. All adjustments of this type should be noted and explained in the final report.

33 After reviewing the record, the methods of calculation to be adopted must be decided upon. There are two distinctly different methods available and it is necessary to recognize the conditions under which each may be used. These methods are:

(*a*) The method using primary averages in which all readings of each instrument are averaged for a given period and these averages are then used in calculating final results, and

(*b*) The method using final averages in which the final result is calculated from each set of coincident observations and the final results are then averaged as a grand average.

The choice between these two methods of calculating results should be determined by the type of formula involved and the degree of accuracy desired. When the formula involves the sum or difference of first powers of the observed quantities, either method will give the same numerical results; when the formula involves the product or the quotient of first powers, the two methods will agree quite closely; but when the formula involves fractional powers or powers greater than the first, the method of primary averages will give approximate results only. The error resulting from the use of this method is due to the fact that averages of fractional or multiple powers are not numerically the same as the fractional or multiple powers of averages.

34 When working up the results graphical logs of the principal quantities and of the principal results should be prepared for inclusion in the report. The Report of the Joint Committee on Standards for Graphic Presentation may be used as a general guide.

35 In working out results and in making reports the principles of the theory of errors may be applied to determine what observations should be rejected, the manner of treating the data obtained and assigning the relative importance of various quantities determined.

Report

36 The report of a test of considerable magnitude should be divided into three distinct parts, as follows:

(*a*) Brief statement of object, results, conclusions and recommendations.

(*b*) Complete presentation of the leading facts regarding the entire work.

(*c*) Appendices giving details which are not included in (*b*) such as methods of calculation, methods of calibration, descriptions of special testing apparatus, results of preliminary or special tests, etc.

(*Continued on page 725*)

First Meeting of the American Engineering Council

Thirty Societies Represented—Herbert Hoover Elected President—Engineers of the Nation Now Organized for United Action in Public Service

AT the first meeting of the American Engineering Council of The Federated American Engineering Societies at Washington, D. C., November 18 to 20, there was an auspicious beginning of activities by the election of Herbert Hoover as president. Five sessions were held to complete the organization of the Federation which is to unite the engineers of America for service to the city, state, and nation. Delegates were present from 21 member societes having an enrollment of 50,000 engineers, and representatives from the nine organizations which are considering membership. The conference is one of the most important and significant events in the history of engineering and portends a broadening vision and wider field of influence for the engineer.

Herbert Hoover
President of the Federation

The Council voted to establish permanent headquarters at Washington, D. C., and at a meeting of the Executive Board a committee was appointed to nominate a candidate for executive secretary. Until such executive is appointed, Mr. L. P. Alford, formerly secretary of the Joint Conference Committee, is to act as temporary secretary, with headquarters in the rooms of The American Society of Mechanical Engineers at 29 West 39th Street, New York.

Mr. Hoover gave an address on Industrial Relations, an abstract of which appears below. This resulted in a movement for a committee on Industrial Waste to consider problems of human relations in industry and coöperation between labor and capital.

The Opening Session

The call to order was by Richard L. Humphrey, of Philadelphia, Pa., chairman of the Joint Conference Committee. He briefly recounted the history of the movement which resulted in the Federation and of the Organizing Conference last June in which delegates from 72 organizations, representing 100,000 engineers, took part.[1] Since that time he stated, the Joint Conference Committee, which has conducted the affairs of the Federation preliminary to the first meeting of its governing body, has kept in touch with the 116 organizations invited to become members of the Federation and has received replies from all but about 3 per cent of the aggregate membership represented. Of this membership, 35 per cent have accepted the invitation; and, including the participating organizations who have given the matter of membership favorable consideration but as yet have not taken final action, 50 per cent were represented in this first meeting. In other words there were delegates in attendance from 21 societies and representatives from 9 participating societies. The largest delegation was from The American Society of Mechanical Engineers.

Mr. Humphrey also spoke briefly of the opportunities and activities that lay before the Federation and expressed his satisfaction that the keynote of the organization centered around the one word—Service. In this connection he said in part:

> You are embarking on a broad field of activity under the critical but hopeful eyes of the entire engineering and allied technical professions. It, therefore, behooves you to maintain the high ideals and add to the traditions of these professions.
>
> It is highly essential to organize and catalogue the engineering resources of this country, to the end that the engineering and allied technical professions shall not again be lacking in preparedness as they were at the beginning of the late war. The best method should be devised for framing a national engineering policy by which The Federated American Engineering Societies can be instrumental in shaping a program for our great national engineering problems. Furthermore the vital need for constructive suggestions based upon careful study of the great national problems, such as transportation, conservation of labor, water, fuel, and other natural resources, should be met through the work of this organization.

Following the remarks by Mr. Humphrey, E. S. Carman, of Cleveland, delegate of The American Society of Mechanical Engineers, was elected temporary chairman, and W. E. Rolfe, delegate of the Associated Engineering Societies of St. Louis, temporary secretary. Mr. Carman, in taking the chair, declared, in accord with Mr. Humphrey, that the keynote of the new organization was embodied in the word "service" and expressed the hope that its aim would always be toward the highest pinnacle.

Resolutions were next passed expressing sincere regret that Mr. Humphrey, who had labored so faithfully for the Federation, and his colleagues of the American Society of Civil Engineers, were not permitted to participate officially.[1] The delegates very graciously accorded the privilege of the floor to these gentlemen by a rising vote.

The meeting then considered the question as to what organizations should be considered charter members and it was voted that all organizations to which invitations had been sent to join the Federation should be considered charter members if acceptances were received by July 1, 1921.

The following temporary committees were then appointed and were instructed to report at the next morning's session: Program, Credentials, Constitution and By-Laws, Nominations, Plan and Scope, Budget, and Resolutions.

L. P. Alford next took the floor and announced the representation on the Executive Board in accordance with the constitution to be by districts for local societies (one delegate from each district) and on the basis of membership for the national societies. The country for the present is to be divided into six districts, as follows: (1) New England and New York State; (2) Minnesota, Wisconsin, and Michigan; (3) Illinois, Indiana, and Ohio; (4) Pennsylvania, New Jersey, Maryland, and Delaware; (5) States south of the Ohio River and east of the Mississippi, and Texas, and Louisiana; (6) States west of the Mississippi, with the exception of Minnesota, Texas, and Louisiana.

This division allows six representatives from local organizations and 14 from the national societies which are now members of the Federation, the latter number being divided as indicated by

[1] See Mechanical Engineering, July 1920.

[1] By a recent letter ballot the American Society of Civil Engineers voted against joining the Federation.

the number in parentheses which follows the names of the national societies listed below.

The remainder of the morning session was devoted to a discussion of the location of the Federations' headquarters. Consideration was given to the advantages of locations geographically central and at or near the industrial center of the country; and to the relative advantages of New York, where is located the headquarters of the national engineering societies, and of Washington, D. C. New York from the start was practically counted out. It was considered by many speakers that while there were evident business reasons for selecting New York City, the national character of the organization would be better emphasized by locating elsewhere. Many favored Washington. Besides the governmental departments with which the Federation would need to be in close communication in respect to engineering matters of national importance, Washington is already the headquarters of many organizations of prominence and with whom conference would be needed.

Objection to Washington was that its selection might lead to the impression that the Federation was organized for political purposes and that its officers were engaged in lobbying and other undesirable practices. Nevertheless the trend of opinion was that Washington was the most favorable point for contact with those engaged in promoting the best interests of the nation and in rendering service of various kinds to the citizens of the country. In none of the discussions was a geographically central location for headquarters considered as more than of secondary importance, since it would merely affect the convenience of delegates traveling to headquarters and in so far as the operation of the executive staff is concerned might result in less effective work. In any case it was considered essential that there should be a Washington office.

At the conclusion of this discussion, Philip N. Moore of St. Louis offered a resolution, with the proviso that it be laid on the table for discussion at the afternoon session, that it be the sense of the meeting that the headquarters of the Federation be located in Washington, D. C. This motion was duly seconded, whereupon the morning session was adjourned.

The Afternoon Session

The afternoon session, beginning at two o'clock, was opened by an address on Engineering Council by J. Parke Channing of New York. Mr. Channing has served as chairman of the Council for the past three years and his remarks as to the work accomplished during that time and the tasks before the new American Engineering Council were largely in the nature of recommendations and warnings to the new body. Speaking of the accomplishments of the old Engineering Council, Mr. Channing said in part:

> During the war we furnished the Government with the names of 4000 engineers for war service. We aided the Naval Consulting Board and the Army General Staff in examining 135,000 suggestions and inventions for war devices. We assisted the Fuel Administrator and the Bureau of Mines. We supplied Congress with information about waterpower.
>
> On January 1, 1919, we opened an office in Washington giving varied service to engineers, and have also aided the Government in engineering matters.
>
> In April, 1919, we called a conference at Chicago of seventy-four technical organizations having 105,000 members. This conference is permanently organized and is advocating the establishment of a National Department of Public Works.
>
> Through an appeal to the President, we have brought together a conference of fourteen Government offices engaged in map making, with prospects of getting under one head the completion of the topographical map of the United States.
>
> We now have a Classification and Compensation Committee of Engineers, with sections on Railways, Federal Government, Municipal and State Governments, and we are working in harmony with the Congressional Joint Committee on Reclassification of Salaries.
>
> We have just drafted a typical law for the registration of engineers and we have joined with the National Research Board in a report on an improvement of the patent system as a result of which legislative action is being taken.

Member-Societies and Representatives at the First Meeting of American Engineering Council

Washington, D. C., November 18–19, 1920

Alabama Technical Association, Birmingham, Ala.
PAUL WRIGHT, Birmingham, Ala.

American Institute of Chemical Engineers, Brooklyn, N. Y. (1)
ALLERTON S. CUSHMAN, Washington, D. C.
* HARRISON E. HOWE (*alternate*), Washington, D. C.

American Institute of Electrical Engineers, New York, N. Y. (4)
* CALVERT TOWNLEY (*chairman*), New York, N. Y.
COMFORT A. ADAMS, Cambridge, Mass.
A. W. BERRESFORD, Milwaukee, Wis.
* H. W. BUCK, New York, N. Y.
F. L. HUTCHINSON, New York, N. Y.
W. A. LYMAN, St. Louis, Mo.
* WILLIAM MCCLELLAN, Philadelphia, Pa.
L. F. MOREHOUSE, New York, N. Y.
LEWIS T. ROBINSON, Schenectady, N. Y.
CHARLES S. RUFFNER, New York, N. Y.
* CHARLES F. SCOTT, New Haven, Conn.
* LEWIS B. STILLWELL, New York, N. Y.

American Institute of Mining and Metallurgical Engineers, New York, N. Y. (3)
* HERBERT HOOVER, Palo Alto, Calif.
* J. PARKE CHANNING, New York, N. Y.
ARTHUR S. DWIGHT, New York, N. Y.
EDWIN LUDLOW, New York, N. Y.
ALLEN H. ROGERS, Boston, Mass.
PHILIP N. MOORE, St. Louis, Mo.
JOHN V. W. REYNDERS, New York, N. Y.
JOSEPH W. RICHARDS, Bethlehem, Pa.

American Society of Agricultural Engineers, Ames, Iowa (1)
SAMUEL H. MCCRORY, Washington, D. C.

American Society of Mechanical Engineers, New York, N. Y. (4)
* L. P. ALFORD (*chairman*), New York, N. Y.
CHARLES T. MAIN, Boston, Mass.
* ARTHUR M. GREENE, JR., Troy, N. Y.
* E. S. CARMAN, Cleveland, Ohio.
ARTHUR L. RICE, Chicago, Ill.
* DEXTER S. KIMBALL, Ithaca, N. Y.
PAUL WRIGHT, Birmingham, Ala.
W. A. HANLEY, Indianapolis, Ind.
WILLIAM B. GREGORY, New Orleans, La.
V. M. PALMER, Rochester, N. Y.
H. P. PORTER, Tulsa, Okla.
ROBERT H. FERNALD, Philadelphia, Pa.
L. C. NORDMEYER, St. Louis, Mo.
* FRED J. MILLER (*alternate*), Centre Bridge, Pa.
ROBERT SIBLEY (*alternate*), San Francisco, Calif.
CHARLES WHITING BAKER (*alternate*), New York, N. Y.

Associated Engineering Societies of St. Louis, Mo.
* WILLIAM E. ROLFE, St. Louis, Mo.

Detroit Engineering Society, Detroit, Mich.
D. J. STERRETT, Detroit, Mich.

Engineering Association of Nashville, Tenn.
C. B. HOWARD, Nashville, Tenn.

Engineering Society of Buffalo, N. Y.
W. B. POWELL, Buffalo, N. Y.

Grand Rapids Engineering Society, Grand Rapids, Mich.
BURRITT A. PARKS, Grand Rapids, Mich.

Kansas Engineering Society, Topeka, Kan.
* LLOYD B. SMITH, Topeka, Kan.

Louisiana Engineering Society, New Orleans, La.
WILLIAM B. GREGORY, New Orleans, La.

Mohawk Valley Engineers' Club, Utica, N. Y.
BYRON E. WHITE, Utica, N. Y.

Technical Club of Dallas, Tex.
* O. H. KOCH, Dallas, Tex.

The Cleveland Engineering Society, Cleveland, Ohio
* JOHN F. OBERLIN, Cleveland, Ohio.

The Engineers' Club of Baltimore, Md.
W. W. VARNEY, Baltimore, Md.

The Society of Industrial Engineers, Chicago, Ill. (1)
* L. W. WALLACE, Baltimore, Md.

Washington Society of Engineers, Washington, D. C.
E. C. BARNARD, Washington, D. C.

York Engineering Society, York, Pa.
WILLIAM J. FISHER, York, Pa.
H. A. DELANO (*alternate*), York, Pa.

* *Present Members of Executive Board*

This shows the general lines along which we have been working and I would suggest that the new American Engineering Council follow in a general way such lines. You will find that you will have to be most rigorous in determining what activities you may undertake and will have to turn down many suggestions which you will find are beyond the province of your Council.

Organized as you are with a broader support than Engineering Council, you will be able to make recommendations on state and local questions through local societies which are members of your body. But you must be careful and not permit yourself to be used for movements which however good in themselves are not especially under the perview of engineers.

Following Mr. Channings' address the chair called upon Alfred D. Flinn, secretary of Engineering Council, Philip N. Moore, and Dr. D. S. Jacobus to express their views as to the field of activity of the Federation. Mr. Moore and Dr. Jacobus have both been active in the work of Engineering Council and Mr. Flinn has served as secretary of the body for the past four years. Their remarks were accordingly received with great interest by the delegates assembled. It was their chief and unanimous opinion that the new American Engineering Council should carry on the work begun by the old Council extending it so as to cover a wider field and thus be of greater service to its member societies and in turn to the individual members. New lines of endeavor would soon develop they also asserted but as to participation in all of these they counseled careful thought before decisions were reached.

Following this discussion the motion of Mr. Moore relative to the location of the headquarters of the Federation, in accordance with the decision of the morning session, was next taken from the table. It was further discussed along the lines followed in the morning. An amendment was finally made to refer it to the Executive Board with power to act. This however was defeated and upon the original motion being put 29 delegates voted in favor and six against. This decision, which thus locates the headquarters of the Federation at the National Capitol, concluded the sessions of the first day.

The Friday Morning Session

The Friday session opened at nine o'clock with E. S. Carman, temporary chairman presiding. The chair first announced that the Taylor Society had voted to join the Federation and that their delegate, Morris L. Cooke, was present to take part in the proceedings. The Taylor Society is the twenty-first society to join the Federation.

L. W. Wallace, president of the Society of Industrial Engineers, next addressed the Council on the subject of Labor Conservation. He stressed the importance of safety and welfare work and the necessity of medical advisors in the attainment of such conservation. He also discussed the need of industrial education not alone, as he stated, for the worker but for all, even including the chief executives. Our labor problems, he declared, can only be solved by the earnest coöperation of both employer and employee.

Following Mr. Wallace the Nominating Committee offered its report and at the request of its chairman, D. S. Kimball put before the Council the choice of the committee for president—Herbert Hoover. In his introduction Dean Kimball said that it was important to the profession and the country at large that the standing of the men in the Council should be gaged by their standing among their brothers and that there was one who was thus preëminent. Later he added, "You have elected a statesman, not an engineer."

The list of officers follows:

President

Herbert Hoover, Am. Inst. M. & M. Eng.

Vice-Presidents

Calvert Townley, Am. Inst. Elec. Eng. (2 year term)
W. E. Rolfe, Assoc. Eng. Soc. of St. Louis (2 year term)
D. S. Kimball, Am. Soc. Mech. Eng. (1 year term)
J. Parke Channing, Am. Inst. M. & M. Eng. (1 year term)

Treasurer

L. W. Wallace, Soc. of Ind. Eng.

After formal vote had been taken, Mr. Hoover, was escorted to the platform and took the chair. He briefly expressed his appreciation of the action of the Council and then withdrew for a short time to attend a meeting of the Red Cross which was holding a simultaneous session. In his absence Calvert Townley presided and brief acceptance speeches were next made by all the newly elected officers.

The morning session closed with the presentation of the report of the Committee on Constitution and By-Laws, recommending several minor changes in both the Constitution and By-Laws, but of such a character as not to change the import of their main provisions. The changes were discussed and voted upon item by item.

The Closing Session

The closing session of the Council on Friday afternoon saw Mr. Hoover in the chair. The announcement was first made of the members constituting the Executive Board (see page 721) and this was followed by the report of the Committee on Plan and Scope. This report in the main followed the recommendation made by J. Parke Channing in his address at the opening session. It pointed out in particular the importance of service to state and nation by investigation and advice strictly along non-partisan lines, and the necessity of maintaining contact with the local and regional engineering organizations.

Calvert Townley, as chairman of the Budget Committee, next submitted a tentative budget for the Council's consideration. He explained that if the Federation should not add to its member-societies during the year the estimated income would be $59,000 but if the societies who have already made known their desire to join the Federation should do so then an income of $80,000 might be expected. With these minimum and maximum figures in mind the estimated expenses for the maintenance of the organizations' headquarters, for committee expenses, traveling expenses, etc., would be $56,500 as a minimum and $93,500 as a maximum. The report was accepted and referred to the Executive Board for further consideration.

This concluded the official business of the day but prior to adjournment the Council was addressed by Geo. G. Anderson of Los Angeles, Cal. who told of the results of coöperation among the engineers on the western coast. Much has been accomplished he said, through joint effort and he urged that other states organize local engineering councils.

Address by Herbert Hoover

On Friday evening, November 19, a large audience gathered to listen to an address by Herbert Hoover, president of the Federation, on some Phases of Relationship of Engineering Societies to Public Service. Referring to the great problems which have come as a result of the industrial development of the past fifty years, and the inadequacy of socialism to solve them he said in part:

We have built up our civilization, political, social and economic, on the foundation of individualism. We have found in the course of development of large industry upon this system that individual initiative can be destroyed by allowing concentration of industry and service and thus an economic domination of groups over the whole. We have therefore built up public agencies intended to preserve an equality of opportunity through control of possible economic domination. Our regulation of public utilities and of many other types of industry, aiming chiefly to prevent combination in restraint of free enterprise, is a monument to our attempts to limit this economic domination—to give a square deal. While our system of individualism under controlled capitalism may not be perfect, the alternative offers nothing that warrants its abandonment. Our thought, therefore, needs to be directed to the improvement of this structure and not to its destruction.

A profound development in our economic system, apart from control of capital and service during the last score of years, has been the great growth and consolidation of voluntary local and national associations. We have the growth of great employers' associations, great farmers' associations, great merchants' associations, great labor associations—all economic groups striving by political agitation, propaganda, and other measures to advance group interest. At times they come in sharp conflict with each other and often enough charge each other with crimes against public interest. And to me, one question of the successful development of our economic system rests upon whether we can turn the aspects of these great national associations towards coördination with each other in the solution of national economic problems, or whether they grow into groups for more violent conflict.

The Federated American Engineering Societies stands somewhat apart among these great economic groups, in that it has no special economic interest for its members. Its only interest in the creation of a great national association is public service, to give voice to the thought of the engineers in these questions. And if the engineers with their training in quantitative

thought, with their intimate experience in industrial life, can be of service in bringing about coöperation between these great economic groups of special interests, they will have performed an extraordinary service. The engineers should be able to offer expert service in constructive solution of problems to the individuals in any of these groups And here is a wider vision of this expert service in giving the group service of engineers to group problems.

One of the greatest conflicts rumbling in the distance is that between the employer on one side and organized labor on the other. We hear a great deal from extremists on one side about the domination of organized labor. Probably the tendency to domination exists among extremists on both sides. One of the most perplexing difficulties in all discussion and action in these problems is to eliminate this same extremist. There are certain areas of conflict of interest, but there is between these groups a far greater area of common interest, and if we can find measures by which, through coöperation, the field of common interest can be organized, then the area of conflict can be in the largest degree eliminated.

In this connection the employer sometimes overlooks a fundamental fact in connection with organized labor in the United States. This is that the vast majority of its membership and of its direction are individualists in their attitude of mind and in their social outlook; that the expansion of socialist doctrines finds its most fertile area in the ignorance of many workers, and yet the labor organizations, as they stand today, are the greatest bulwark against socialism. On the other hand, some labor leaders overlook the fact that if we are to maintain our high standards of living, our productivity, it can only be in a society in which we maintain the utmost possible initiative on the part of the employer; and further, that in the long run we can only expand the standard of living by the steady increase of production and the creation of more goods for division over the same numbers.

The American Federation of Labor has publicly stated that it desires the support of the engineering skill of the United States in the development of methods for increasing production and I believe it is the duty of our body to undertake a constructive consideration of these great problems and to give assistance, not only to the Federation of Labor, but also to the other great economic organizations interested in this problem, such as the Employers' Association and the Chambers of Commerce.

It is primary to mention the three-phase waste in production: First, from intermittent employment, second, from unemployment that arises in shifting industrial currents and third, from strikes and lockouts. Beyond this elimination of waste, there is another field of progress in the adoption of measures for positive increase in production.

In the elimination of the great waste and misery of intermittent employment and unemployment, we need at once coördination in economic groups. For example, our engineers have pointed time and again to the bituminous coal industry, where the bad economic functioning of that industry results in an average of but 180 days' employment per annum, where a great measure of solution could be had if a basis of coöperation could be found between the coal operators, the coal miners, the railways, and the great consumers. The combined results would be a higher standard of living to the employees, a reduced risk to the operator, a fundamental expansion of economic life by cheaper fuel. With our necessary legislation against combination and the lack of any organizing force to bring about this coöperation, the industry is helpless unless we can develop some method of governmental interest, not in governmental ownership, but in stimulation to coöperation in better organization.

In help against the misery in the great field of seasonal and other unemployment, we indeed need an expansion and better organization of our local and federal labor exchanges. We have a vast amount of industry, seasonal in character, which must shift its labor complement to other industries. The individual worker is helpless to find the contacts necessary to make this shift unless the machinery for this purpose is provided for him.

In the questions of industrial conflict resulting in lockout and strike, one mitigating measure has been agreed upon in principle by all sections of the community. That is collective bargaining, by which, wherever possible, the parties should settle their difficulties before they start a fight. It is founded not only on the sense of prevention but on the human right to consolidate the worker in a proper balanced position to uphold his rights against the consolidation of capital. This measure, advocated for long years by organized labor, was agreed to by the employers group in the First Industrial Conference. It has been supported in the platform of both political parties. The point where the universal application of collective bargaining has broken down is in the method of its execution. The conflict arises almost wholly over the question of representation and questions of enforcement. The employer in some industries denies the right of men other than his own employees to conduct the negotiations. Labor organizations demand that, as such negotiations require skill, experience and bargaining freedom, they are of more than local application and that thus they only can protect the body of workers by presenting the case on their behalf by skilled negotiators.

The Second Industrial Conference, of which I was a member, proposed a solution to this point by the provision that where there was a conflict over the determination representation should be left to a third party. It also proposed that each party should have the right to summon skill and experience to its assistance. It further proposed that where one of the parties at dispute refuses to enter upon collective bargaining, the entire question should be referred to an independent tribunal for investigation as to the right and wrong of the whole dispute—but only for investigation and report. The conference was convinced that the illumination of the public mind as to the rights and wrongs of these contentions would in itself make for material progress in their solution and that in public education and the condemnation by public opinion of wrong doing lay the root to real progress. The conference did not believe that industrial contention could be cured by compulsory arbitration or any other form of governmental repression.

There are questions in connection with this entire problem of employer and employee relationship, both in its aspects of increased production and in its aspects of wasteful unemployment, that deserve most careful study by our engineers. There lies at the heart of all these questions the great human conception that this is a community working for the benefit of its human members, not for the benefit of its machines or to aggrandize individuals; that if we would build up character and abilities and standard of living in our people, we must have regard to their leisure for citizenship, for recreation, for family life. These considerations, together with protection against strain, must be the fundamentals of determination of hours of labor. These factors being first protected, the maximum production of the country should become the dominating purpose. There is a broad question bearing upon stimulation of self-interest and thus increase in protection that revolves around the method of wage payment. I need not review the advantages, difficulties and weaknesses of bonus, piece-work, profit or saving sharing plans that are in use as a remedy for the deadening results of the same wage payment to good and bad skill alike. The suggestion I wish to put for your consideration is the possible use of another device in encouragement of individual interest and effort by creating two or three levels of wage in agreement for each trade, the position of each man in such scale to be based upon comparative skill and character. This plan should be developed upon the principle of extra graded compensation for added skill and performance, above an agreed basic wage. In order to give confidence, the classification under such scales must be passed upon by representatives of the workers in each shop or department. This plan is now being successfully experimented with.

We must take account of the tendencies of our present repetitive industries to eliminate the creative instinct in its workers, to narrow their field of craftsmanship, to discard entirely the contribution to industry that could be had from their minds as well as from their hands. Indeed, if we are to secure the development of our industries, we could not accomplish increased production without their stimulation. Here again we cannot make an advance unless we can secure coöperation between employer and employee. In large industry this mutuality of interest that existed in small units cannot be restored without definitive organization.

[Mr. Hoover here discussed shop committees as a system of such organization, saying that if organized labor should settle its problems of wage and conditions of labor in general agreement and apply its energies through shop committee organization to development of production as well as to the correction of incidental grievance, another step in coöperation would be accomplished.—Editor.]

There is an immediate problem in increased production that is too often overlooked by the theorist. While it is easy to state that increased production will decrease cost and by providing a greater demand for goods secure increased consumption and ultimate greater employment, yet the early stages of this process do result in unemployment and great misery. We usually accomplish these results over long periods of time, but if we would secure coöperation to accomplish them rapidly we must take account of the unemployment and we must say to the community that if it is to benefit by the cheapening costs and thus the increased standard of living, or alternatively if the employer is to take benefits, the entire burden should not be thrust upon the individual who now alone suffers from industrial changes.

In summary, the main point that I wish to make is this, that there is a great area of common interest between the employer and the employee through the reduction of the great waste of voluntary and involuntary unemployment, and in the increase of production. If we are to secure increased production and an increased standard of living, we must keep awake interest in creation, in craftsmanship, and the contribution of the worker's intelligence to management. Battle and destruction are a poor solution to this problem. The growing strength of national organizations on both sides should not be and must not be contemplated as an alignment for battle. Battle quickly loses its rules of sportsmanship and adopts the rules of barbarism. These organizations—if our society is to go forward instead of backward—should be considered as the fortunate development of influential groups through which skill and mutual consideration can be assembled for coöperation to the solution of these questions. If we could secure such coöperation, throughout all our economic groups, we should have provided a new economic system, based neither on the capitalism of Adam Smith nor upon the socialism of Karl Marx. We should have provided a third alternative that preserves individual initiative, that stimulates it through protection from denomination. We should have given a priceless gift to the twentieth century.

Meeting of the Executive Board

The Executive Board, charged with conducting the business of the Federation under direction of the American Engineering Council, held its first meeting on Saturday morning. In the absence of President Hoover, Vice-President Rolfe presided. Charles F. Scott served as secretary.

The first business was the appointment of a committee to recommend a candidate or candidates for Executive Secretary of the American Engineering Council. Following a discussion Dean D. S. Kimball said he had given the matter much thought and without having consulted others would suggest five names representative of the various interests concerned in the conduct of the affairs of the Council. It was understood that President Hoover would act ex-officio. These names were:

W. W. Wallace, Baltimore, *Chairman*, representing the officers of the Council.
Philip N. Moore, St. Louis, representing A.I.M.E.
Charles F. Scott, New Haven, representing A.I.E.E.
L. P. Alford, New York, representing A.S.M.E.
John F. Oberlin, Cleveland, representing the local societies

It was voted that this committee be appointed, with the addition of the name of Calvert Townley, representing the present Engineering Council, thus constituting with the president, a committee of seven to report at the next meeting.

The question of whether assessments upon member societies should be on the basis of voting membership or of total membership in these societies, was referred to the Committee on Membership and Representation.

The Board declared in favor of continuing the efforts of Engineering Council for a National Department of Public Works. This led to a general discussion of ways and means which could properly be adopted by the Federation for the promotion of public and legislative matters. Maj. Fred J. Miller spoke in opposition to spending money for promotion and to lobbying in any form. He advocated the formulation of policies by the Council and the use of publicity methods to bring them to the attention of legislators and the public. L. B. Stillwell referred to the last French Engineering Congress, held at Paris, as exemplifying a way in which this could be done. Committees were appointed to present reports to the Congress on such public questions as highways, hydraulics, etc., and when formally accepted the reports at once became available for incorporation in legislation and carried with them the prestige of the Congress.

The Board indorsed the plan, previously suggested by President Hoover, for a committee to investigate industrial waste and authorized the president to organize for this purpose. The committee will be the agency through which the Council will take up the question of industrial relations and the losses incident to the lack of coöperation between capital and labor.

It was voted that the establishment of Washington headquarters, as directed by vote of the Council, should be deferred until the appointment of the permanent Executive Secretary, probably in January. To provide for carrying on the current work, and particularly the preparation and distribution of the minutes of the present series of meetings, L. P. Alford was elected temporary secretary with headquarters in the rooms of The American Society of Mechanical Engineers, New York, to serve until the next meeting of the Board.

The last action of the Board was to request The American Society of Mechanical Engineers to give Mr. Alford such assistance on the part of its staff as might be required to conduct temporarily the work of the Federation.

NEWS OF THE ENGINEERING SOCIETIES

Conventions of the American Foundrymen's Association, the American Iron and Steel Institute, and the American Electrochemical Society

American Foundrymen's Association

The annual convention and exhibition of the American Foundrymen's Association took place at Columbus, Ohio, on October 4 to 8. At the technical sessions 67 papers were scheduled, most of which were presented. There were 240 exhibitors and the registered attendance exceeded 3800. An outstanding feature of the convention was the announcement of five donations, four of $5000 each and one of $1000, the income from which will be awarded in recognition of meritorious work in foundry research and invention.

Dr. Richard Moldenke, Watchung, N. J., presented a paper on the elements useful for purifying cast iron, with special reference to zirconium.

A paper on the electric furnace and the problem of sulphur in cast iron was read by George K. Elliot, Lunkenheimer Co., Cincinnati. The tendency of sulphur to segregate, he said, constitutes the greatest menace of high sulphur, but he claimed that it is impossible to fix positively any pronounced advantage in iron with 0.015 or 0.030 per cent sulphur over those with twice that amount. Instead of striving for low sulphur limits the speaker was of the opinion that the use of more scrap or of pig iron running comparatively high in sulphur will become popular. A. N. Kelly, Modern Tool Co., Cincinnati, described the methods employed in the production of machine-tool castings. This paper was illustrated with lantern slides showing the methods employed in the work.

A paper describing the making of high-grade iron castings for milling-machine tables at the plant of the Brown & Sharpe Mfg. Co., Providence, R. I., was read by Leroy Sherman. Papers were also read by E. J. Fowler, San Francisco, on Standardizing Gray-Iron Castings for Analytical Determination; Electrical Apparatus in a Modern Iron Foundry, by F. W. Egan, Pittsburgh; The Foundry of the U.S.S. *Prometheus*, prepared by Lieut. R. F. Nourse; and Approved Methods of Testing Molding Sands, by S. W. Stratton, of the U. S. Bureau of Standards, Washington.

The need for developing standards for molding materials was emphasized and a number of tests for determining the usefulness of sand and clay in the shop were discussed by R. L. Lindstrom, Canadian Steel Foundries, Montreal.

The status of the electric furnace in the steel industry as of September 1, 1920, was surveyed by Edwin F. Cone, associate editor, *The Iron Age*, New York. There were in the United States and Canada on January 1, 1920, 363 furnaces of all types operating or contracted for in the steel industry; on September 1, this figure had been expanded to 374 or a net increase of 11 furnaces. This increase was wholly in the United States.

Annealing Steel with Pulverized Coal was the title of a paper by C. H. Gale, Pressed Steel Car Company, McKees Rocks, Pa. The author stated that where the investigations were conducted a marked difference in the physical characteristics of steel was noticed after pulverized coal was substituted for gas and oil for the annealing furnaces. The tensile strength became greater and the carbon and sulphur content was increased.

Other steel foundry papers were: Cleaning Steel Castings, by A. W. Gregg; Electric Heat Treating of Steel Castings, by E. F. Collins; Making Acid Electric Steel, by James W. Galvin and Charles N. Ring; Making Steel Castings to Specifications, by E. R. Young, Jr.; and Accurate Treatment of Steel Castings, by T. F. Baily, Alliance, Ohio.

Interesting papers on malleable iron were also presented. Enrique Touceda, Albany, described some experiments made with air furnaces, and suggested some changes in open-hearth furnaces for malleable iron. He stated that future advancement in the malleable-iron industry must come through an improvement in plant organization and metallurgical apparatus. Fractures and Microstructures of American Malleable Cast Iron was the subject of a paper by W. R. Bean, H. W. Highriter and E. S. Davenport, Eastern Malleable Iron Co., Naugatuck, Conn. Two papers by H. A. Schwartz, National Malleable Castings Co., Cleveland, described the new research department of that plant, and also the triplex process for making electric-furnace malleable. E. J. Lowry, Oliver Chilled Plow Co., South Bend, Ind., presented a paper on Practical Malleable Annealing.

These notes have been prepared from the extensive account of the convention published in *The Iron Age* for October 14.

American Iron and Steel Institute

The American Iron and Steel Institute held its eighteenth annual convention in New York on October 22. In his presidential address, Judge Elbert H. Gary, recounted his personal observations in a recent tour through France and Belgium, and pre-

dicted speedy recovery by both these nations from the effects of the ravages of war upon industries. In general he took an optimistic view of industry, both abroad and at home.

The technical papers were of the usual high standard. E. A. Wheaton, superintendent, open-hearth department, Bethlehem Steel Co., presented the results of experiments conducted to determine the effect of using a high-manganese iron in the initial basic open-hearth charge. A furnace was operated exclusively on high-manganese iron for a considerable period. The records obtained show that high-manganese iron improves the quality of open-hearth steel without reduction of tonnage or any other injurious effects, and that it is of great assistance in meeting the demands for the better grades of alloy steels. Mr. Wheaton concluded from his data that it is possible, with high-manganese iron, to run lean slags, maintain tonnage, and with sulphur in blast-furnace iron as high as 0.1 per cent to deliver that same iron to the open-hearth furnaces through a mixer with 50 per cent of the sulphur eliminated.

D. M. Buck, metallurgical engineer, American Sheet & Tin Plate Co., Pittsburgh, reviewed the development of copper steel and its non-corrosive properties. Practice has shown that the best results are obtained by alloying with normal open-hearth or bessemer steel, from 0.15 to 0.30 per cent of pure copper. Mr. Buck pointed out that although references are found as early as 1627 to the effect of copper on the physical properties of iron and steel, nothing is found pertaining to the control of corrosion previous to the present century. The relative corrosive properties of untreated and copper-treated iron and steel have been investigated by several authorities from 1900 on. Tests conducted by the American Society for Testing Materials have shown that the life of sheet metal is more than doubled by the copper treatment.

The successful development of the large-hearth blast furnace in the United States was surveyed by Walther Malhesius, superintendent of blast furnaces, Illinois Steel Co., South Chicago, Ill. Hearth dimensions have been increased over the accepted standard without interfering with the height or angle of bosh. The average hearth diameter of all 22-ft. bosh furnaces at the South Chicago plant of the Illinois Steel Co. was increased from $16^1/_2$ ft. in 1911 to $18^1/_2$ ft. in 1919. The best average monthly production of these furnaces equaled 512 tons per furnace per day in December 1911, as against 556 tons in May 1920. Mr. Mathesius attributed the increased output to the adoption of the larger hearths, as no enlargement of the furnaces or important changes of lines above the bosh were made. The fuel consumption per ton of iron for the two periods cited above were 2053 lb. in December 1911, and 2037 lb. in May 1920. Further proof of the successful operation of the larger hearth has been furnished by the operation for some time of a furnace with a hearth diameter of 20 ft. 9 in. This furnace was described at length by Mr. Mathesius, and he presented tables of its performance as well as of the average results of other South Chicago furnaces. The furnace with a 20-ft. 9-in. hearth has consistently worked with a more regular and uniformly lower blast pressure than the other furnaces under comparative conditions. Contrary to what has been claimed as to a large hearth requiring an increase in the number of tuyeres, the furnaces at the South Chicago works have worked well with distances between tuyeres of 4 ft. $7^3/_4$ in., 4 ft. $11^3/_4$ in.; 5 ft. $9^3/_4$ in., 5 ft. $10^5/_8$ in., and 6 ft. $6^1/_4$ in., the last figure corresponding to the furnace with the 20-ft. 9-in. hearth. The enlargement has not imposed additional or increased stresses and duties, while in some respects the demands upon the strength and wearing qualities have actually lessened. Mr. Mathesius pointed out that the successful development of the large-hearth blast furnace, unhampered by any sacrifice of former advantages, is an exclusively American accomplishment, which is evoking the keenest interest abroad.

F. L. Toy, superintendent of open hearths, Homestead Works, Carnegie Steel Co., surveyed the practice in the manufacture of basic open-hearth steel. He referred specially to the improved devices and methods which have been developed for preserving and lengthening the life of the furnace, and discussed in detail the merits of the various fuels for melting the charge, and the efficiency of the furnaces. Other papers were: Recent Developments in the Iron and Steel Industry of India, by C. P. Perrin; Foreign Trade, by A. H. Holliday; and Heat Treatment of Automobile Steels, by R. R. Abbott.

American Electrochemical Society

The thirty-eighth general meeting of the American Electrochemical Society was held in Cleveland on September 30 and October 1 and 2. The technical papers dealt principally with various phases of the application of electric furnaces in the steel industry. Experiments on heat losses through electrodes were reported by M. R. Wolfe and V. de Wysocki, of Lehigh University. A six-ton Heroult furnace was provided with special water-cooled rings. From records obtained by measuring the temperature of the water at intervals, the heat loss through the electrodes was estimated at 18.7 per cent of the total power supplied to the furnace. Data on the influence of copper, manganese, and chromium on the corrosion of their iron alloys, were presented by E. A. and L. T. Richardson, General Electric Co., Cleveland. Tests showed that there is a mutual action between manganese, and copper in their effect upon the atmospheric corrosion of iron. Copper alone reduces the corrosion of pure iron and to a still greater extent the corrosion of steel. This is due to the effect of manganese, which enhances the effect of copper. If manganese is replaced by chromium the effect is still more pronounced. The red-short range in iron due to the presence of copper is removed by either manganese or chromium. It is believed that there is some relation between this red-short range and resistance to atmospheric corrosion. Based upon this the film intergrain hypothesis is suggested to explain the corrosion resistance of these alloys.

A new portable standard cell was described by C. J. Rodman and Thomas Spooner. It is of the cadmium type of special design with the usual ingredients, but it has a container of hard glass with tungsten leads. Instead of the common H-type a compact concentric arrangement has been devised. Measurements of the electrical resistivity of specialized refractories were presented by M. L. Hartman, A. P. Sullivan, and D. E. Allen, research laboratory, Carborundum Co. A progress report of the Söderberg continuous electrode installation at Anniston, Ala. was submitted by Dr. Joseph W. Richards. The Söderberg electrode was introduced into the United States by Elektrokemisk Industri of Christiania, Norway. Ferromanganese is manufactured in an 1800-kw. electric furnace at the Anniston plant. Attempts to use pure nickel wire as a furnace resistor in place of nichrome wire were related by F. A. J. FitzGerald and Grant C. Mayer, FitzGerald Laboratories.

POWER TEST CODES

(Continued from page 719)

The complete statement referred to in (*b*) above should be divided as follows:

1 Object, giving authority, preliminary agreements and other relevant information.
2 Description of apparatus tested.
3 Methods of testing, giving conditions of operation, location, arrangement and method of using instruments and testing apparatus, and personnel.
4 Discussion of the data and results both as to accuracy and as bearing on the object of the test.
5 Leading conclusions.
6 Tables of data and calculated results or graphical expositions of the same.
7 Charts not included under item 6.

Reports of tests of lesser magnitude should follow the same general plan.

37 In preparing a report the work should be so done that the report will be self-contained in all respects. The best test of such a requirement is to assume that the report may be brought into court in connection with litigation involving the object for which the test was made. If the report can stand alone under such conditions it may be considered complete.

(*Signed*) William. H. Kavanaugh, *Chairman*,
Charles J. Bacon,
Geo. H. Barrus,
Arthur M. Greene, Jr.,
Clarence F. Hirshfeld.

ARMOR-PLATE AND GUN-FORGING PLANT OF U. S. NAVY

(*Continued from page 668*)

The machine-tool layout and the specifying and purchasing of the equipment was done by the machine-shop superintendent, Mr. W. E. Hayes, who is the head of the Cold Metal Department.

The general layout, industrial and structural design, design of plant services crane specifications, foundation design for all equipment, etc., were made under the author's direction in the Bureau of Yards and Docks at Washington, and details completed at South Charleston when the engineering force, with the exception of the Electrical Division, was transferred there in the Spring of 1919 to be in closer touch with the work. A Construction and Maintenance Department was organized at the Naval Ordnance Plant to build the new plant and carry on the maintenance of the Projectile Plant. It employed at maximum strength some 40 to 50 designers and draftsmen and somewhat over 1200 men in the field. The principal assistants of the writer, as head of the Construction and Maintenance Department were Mr. J. Hepinstall, supervising engineer of design; Mr. T. H. Callahan, supervising engineer of construction; Mr. W. H. Sears, materials and office, and Mr. H. M. Cogan, supervising engineer of electrical design.

Costs

Final figures of cost are not yet available. In round numbers it may be stated that the entire plant when completed will represent an investment of about $20,000,000. Construction items of the plant, including cost of all structures completely enclosed and with services, including overhead cranes but exclusive of operating equipment and equipment foundations, will total somewhat over $10,000,000.

The cost records, kept both by the intricate Navy system of accounting which imposes a more or less arbitrary overhead based on the amount of productive labor; and on a man-hour and material basis kept separately by the author, indicate that the work has been done economically. The percentage profit of a general contractor has been saved to the Department. A saving has also been made by the use of Navy cost-plus and Army salvage material and equipment.

The method adopted of handling the entire construction of the armor and gun-forging plant within the Department proved very flexible and made it possible to keep the design work and the construction work in close harmony. It also permitted essential eleventh-hour changes to be made with less inconvenience and delay than would have been possible dealing through a general contractor.

If armor ingots are cast in December, as is confidently expected, it will have taken two years and six months, in exceedingly trying times as to labor and material, to bring the plant from the "open-lot and blank-paper" stage to operation.

DISCUSSION—STEAM vs. ELECTRIC LOCOMOTIVES

(*Continued from page 688*)

to the operation of electric locomotives, and are just as much a part of the electric locomotive as the boiler is of the steam locomotive.

Extent of Electrification. Where electrification is contemplated a very serious question is: What shall be its extent? Naturally the desire would be to wipe out as many as possible of the extensive accessories to steam operation. If, however, it becomes necessary to operate steam trains over the electrified section, it will obviously be necessary to retain water stations and possibly fuel stations, provided the electrified section is sufficiently long. This operation of steam locomotives under their own power over electrified sections would be necessary in case of redistribution and possibly in case of diversions where the electrified section formed part of the diverted line. Therefore, the claim for economy in doing away with these features of steam operation would probably not be realized.

In commenting on the paper presented by Mr. Muhlfeld, Mr. Gibbs said that he believed his enthusiasm had carried him too far in minimizing the advantages of electrification. The operation of the electrified roads has undoubtedly been good whether it be terminal or road operation. He thought Mr. Muhlfeld also ignored the fact that the modern improvements which have so added to the performance of the steam locomotives are potential only. For instance, it is very possible and common by indifference to so carry water in the boiler that the superheater becomes merely a steam drier and its value disappears. In many cases, because of neglect of damper mechanism or from dirty flues, little benefit is derived from improved appliances. Modernizing of steam locomotives calls for the intelligent use of the devices, which will come when the old spirit of loyalty returns.

In summarizing his remarks Mr. Gibbs said in part: "It is to be noted that practically all of the electrifications on steam railroads so far have been based on local conditions. In the electrifications in and around cities a moving cause has been the elimination of smoke and other objectionable features incidental to steam operation, and the possibility of increasing the capacities of the passenger terminals. On the Milwaukee road it was the utilization of available water power. On the Norfolk & Western it was to secure increase in capacity on a congested mountain division with tunnel complications. It is fair to assume that other electrifications will be similarly governed by local conditions.

"If, after careful consideration of the road, based on actual train sheets for the heaviest actual or probable congested operation; the capacity and number of active and available locomotives required; crediting the operation with incidental savings which may be effected, and eliminating expenses peculiar to steam operation; it appears that there would be economy in electrification, either from actual savings or better operation, or both, it still remains for the management to decide whether the money required can be spent to better advantage for electrification than for some other features of the general operation."

Book Notes

Condensed Catalogues of Mechanical Equipment. Comprising Condensed, Uniformly Presented and Illustrated Catalogue Information Covering the Products of Manufacturers of Various Classes of Mechanical Equipment, with General Classified Directory and Consulting Engineers' Directory. Tenth annual volume. American Society of Mechanical Engineers, New York, 1920. Cloth, 6 × 9 in., 1004 pp., illus., $4.

The tenth edition of this catalog and directory of mechanical equipment and consulting engineers follows the established lines, although the data on A.S.M.E. standards have been omitted from this issue. Five hundred and nine firms are represented by condensed catalogs of their products, this section being eighty pages longer than in 1919. The directory of mechanical equipment, in which manufacturers are listed under products, is ten per cent larger, and the directory of consulting engineers covers sixty per cent more pages than before. Various improvements have also been made to facilitate convenient reference.

The Coal Trade. The Year Book of the Coal and Coke Industry. By Sydney A. Hale. 47th annual edition. The Estate of F. E. Saward, New York, 1920. Cloth, 6 × 8 in., 352 pp., tables, $4.

The present volume is, the compiler states, the largest in size and the widest in scope yet issued. It includes a variety of statistical tables of interest to those in the coal industry, brought to the latest possible dates, and information showing the development of the industry during the past year. The book contains statistics of production, exports, imports, costs, prices, ocean rates, wages and similar matter, as well as reviews of important occurrences.

Common Sense and Labour. By Samuel Crowther. Doubleday, Page & Co., Garden City, N. Y., 1920. Cloth, 5 × 8 in., 284 pp., $2.

The author discusses the causes of present-day dissatisfaction between workmen and employers, the various remedies that have been suggested, and the results obtained in actual cases. Written in readable style, and of interest to employers.

In Two Sections—Section Two

Volume 42 Number 1

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

JANUARY, 1920

A. S. M. E. Affairs

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Coming Section Meetings

Atlanta Section.

January 27: In Carnegie Library reading room. Oil as a Fuel, by Charles M. Rogers, Rogers Higgins Co.

Boston Section.

January 22: At the Boston Engineers' Club.
Subject: Research. Speakers: Dean John R. Allen and Prof. A. M. Greene, Jr.

Buffalo Section.

January 6: At the Ellicott Club, 10th Floor.
Subject: Oxy-Acetylene Welding, by Major C. K. Bryce.

Cleveland Section.

January 27: In the rooms of the Cleveland Engineering Society, Roof Garden, Hotel Statler, 8 p. m. Subject to be announced later.
Luncheons are served daily to members and guests (ladies invited) in the dining room of the Cleveland Engineering Society, Roof Garden, Hotel Statler.

Eastern New York Section.

January 23: At Edison Hall, Schenectady.
Subject: Gages, by C. E. Johansson, of C. E. Johansson, Inc., New York.

Indianapolis Section.

Every Thursday: Luncheon meeting at the Scientech Club.

Minnesota Section.

January 9: At the Midway Branch, St. Paul Chamber of Commerce.
Dean Kimball to be speaker. Subject to be announced.

New Haven Branch.

January 14: At the Mason Laboratory, Yale University.
8 p. m. Subject to be announced.

New Orleans Section.

January 12: At the Louisiana Engineering Society.
Annual Meeting and Smoker.

New York Section.

January 13: At the Engineering Societies Building.
Subject: New Uses of Fuel. 8 p. m. Speaker to be announced.

Philadelphia Section.

January 27: At the Philadelphia Engineers' Club.
Subject: Modern Boiler-Room Practice, by Norman Reinicker, Supt. of Operation, Lehigh Valley Light & Power Co.

St. Louis Section.

January 2: At Hotel Statler.
New Problems in Engineering, by Dr. Ira N. Hollis.

San Francisco Section.

January 8: At the San Francisco Engineers' Club.
Subject: The Industrial Uses of Gas, by B. W. M. Henderson, H. M. Crawford, and M. Balliet, of Moore Ship Building Co. Luncheon meeting at San Francisco Engineers' Club every Thursday.

SOCIETY AFFAIRS

Secretary's Letter—Council Notes—Society Prizes—Professional Sections—Recommendations on A. S. M. E. Policy—Local Sections Conference—New Officers of the Society—Personals—Necrology—Employment Bulletin—Candidates for Membership

An Inclusive National Organization of Engineers

The Secretary's Letter

WE have just received calls from Captain Tuccumei, of Rome, and from Mr. Ernest M. Hughman, of Calcutta. Both announced that in their respective countries there has been instituted an inclusive national organization of the engineering profession.

The first impression on the Secretary is that the idea of the need of such inclusive organizations is world-wide, rather than peculiar to either these two countries or to the United States. We in America who have been so close to this situation and familiar with the work of the several committees on development of the engineering societies and with the discussion during the last few years of an organization for "welfare" work, had forgotten for the moment that such organizations were needed or considered just as much in other countries. While we have not even yet settled on the type of organization, two other countries at least have already effected preliminary organizations.

In the statement of the objects of the new National Association of Italian Engineers, the emphasis is on the personal and economic features, the same as it is throughout the world, with only two exceptions, in the stated objects of all technical and learned organizations of all descriptions. That is, the new Italian society is no better and no worse in this respect than other professional bodies, either in our own country or other countries. The organization is an advance only in its inclusive character, in that it is constituted to undertake the economic and welfare features of the profession of engineering as well as the technical. In our country so far there has been a tendency to continue the conservative and strictly professional work of the national engineering societies as the sole activities of those societies, and to favor a separate organization of some kind to undertake the other activities.

With the forward movement in ideals of our nation, as was evidenced in our altruistic participation in the war, the Secretary had hoped that the professional engineering societies would respond and put the emphasis on their service for the good of the community as the principal object of their organization. This can be done without in any way neglecting the economic and so-called "welfare" work, which we all must consider in order to live. The Secretary believes in practical Christianity. Or, to put it another way, he would like to see our scope of activities include at the beginning the objects for the common good and conclude with consideration of economic features, remuneration, etc. As we have not yet determined on the type of organization for the engineering profession in the United States which is to undertake such activities as agitation for a National Department of Public Works, conservation of natural resources, uniform laws for the registration of engineers, etc., there is yet an opportunity to make these objects the first attention of the organized societies of the profession.

The Italian organization is avowedly one of defence, that is, to place the engineering profession on an equal plane with that of law and medicine in Italy. The following are quotations:

> *a* To obtain and preserve . . . . the place which belongs to the class of engineers.
>
> *b* To secure the necessary legislative measures for the protection of the title, standing and professional rights, and particularly the legal recognition of the orders of engineers.
>
> *c* To defend with all possible energy, the economic interest of the class, and promote the representation of Italian engineers in industrial enterprises in Italy.

Then follows a number of similar features such as professional standing of engineers, recognition of the association, civil and military representation, including education, publicity, etc., etc.

The Secretary has never held that such objects for a technical, professional or learned society are undesirable in themselves, but he has stated that the emphasis should not be placed on these objects to the exclusion, in most constitutions, of any stated object of the higher aims which it is now beginning to be recognized should characterize the organizations composed of professional men.

The proposed Indian Society of Engineers will be under the direct patronage of the Viceroy of India, who will preside at its opening meeting this month. Our Past-President, Mr. John R. Freeman, is en route to India, but I very much fear he will not be able to reach there in time to participate in this auspicious function. Another Past-President, Mr. Jesse M. Smith, is about to sail from San Francisco for the Orient and will pass through India on his tour of the world, and it is the intention of the Secretary to acquaint both of our past-presidents with the formation of this new National Society and of the cordial invitations extended by Mr. Hughman, one of the organizers, and the honorary secretary of the India Center of the Institution of Electrical Engineers of Great Britain, to call upon the prospective president of the new society, Sir Thomas Holland, K.C.S.I., K.C.I.E.

Although I have not seen the prospectus of the proposed Indian Society yet, I can judge from Mr. Hughman's statements that whereas it will require the highest professional attainment of any professional engineering society and will be inclusive in its objects of all phases of the work of the professional engineer, yet I can see that it will be primarily tending, if not quite, to be devoted to the higher aims of the profession such as association with the Chambers of Commerce, the Port Trusts of India, etc., and to deal with the questions of engineering standards for India, and the engineering departments of the government even to such a degree as to make it compulsory possibly on the part of those departments to consult with the new society.

It is obvious that only the greatest degree of self-sacrifice and devotion to the public good on the part of the leading members of such an organization can bring about these results.

The Indian society expects to have a central engineering building with branch buildings and libraries in Calcutta, Bombay, Delhi, Lahore, Karachi, Burma, Madras and Ceylon. Special attention will also be given to the education of the Indian engineer in India.

Just before the Annual Meeting of our Society the Secretary attended in Detroit an Inter-Professional Conference made up of the representatives of over twenty-two professions, including law, medicine, dentistry, architecture, engineering, etc. The objects of the conference were to determine:

(1) possibilities of coöperation between the professions for the common good

(2) a comparison of ethical standards of the different professions; how far they are socially minded; how far self-regarding

(3) how the idea of obligation for public service can be extended among the professions

(4) whether the enthusiasm of war-time service to the Government can be perpetuated in any appreciable degree

(5) how a better qualified technical service can be secured to the federal, state and municipal Governments

(6) how public opinion can be directed to the necessity for this service

(7) how education for the professions can be made more real as to the problems of today

(8) whether the men in professional practice are in sufficiently close touch with technical educational institutions

(9) what can be done to spread, in the high schools and colleges, knowledge of the significance, ideals and functions of the several professions.

The above illustrates the trend of thought today, and it becomes every member of the Society to associate himself actively in the development of our ideals. In my mind a way open to every one is to commence in the local professional organization in the community where he lives, and in turn to see to it that that association is a force for good in all features of the community life in which the technical professional man's special knowledge can serve that community.

In the coming month in Washington will be the second conference called by the National Public Works Department Association to further the movement for a separate National Department of Public Works headed by a cabinet officer. This is something behind which every man should get and he should see to it that he is posted on all of the arguments in its favor and acquaint all chambers of commerce, merchants' associations, civic bodies, rotary clubs, etc., throughout the country of the benefit to the nation from such a coöperative department for undertaking the engineering work of the nation.

CALVIN W. RICE,
Secretary.

Council Notes

Three meetings of the Council were held at the time of the Annual Meeting. The first was held on Monday, December 1, the day before the opening of the Convention, and was the regular November meeting advanced in date to take advantage of the presence of the Council members at the Annual Meeting. The second was held on the following day and was the last meeting of the 1919 Council. The third meeting, held on December 5th, was the first meeting of the Council for 1920.

At all of these meetings important matters of policy of the Society were taken up and some of these are elaborated into separate articles in this issue. The following is the usual brief account of the business transacted, and the special articles supplement this account:

Probably the most important business was a vote to put on record the desire of the Council to amend the Constitution of the American Engineering Standards Committee at a future date in order to define more explicitly the machinery by which this Committee is to function and its relations to the bodies represented in its membership and the methods of its approval of standards prepared by them. It was pointed out that in its recent action to approve the revised Constitution of this Committee, the Council was acting uniformly with the other Founder Societies for the purpose of permitting the A. E. S. Committee to get under way and it was realized at the time that even the revised Constitution had weaknesses and could be very much improved. Those who have followed the actions of the societies in creating and developing the American Engineering Standards Committee will appreciate the difficulties which have confronted the organizations and will be sympathetic with the earnest desire of all the societies to provide ultimately a satisfactory organization for the promulgation of engineering standards of all kinds.

The Council formally endorsed the publication by the National Research Council of Critical Tables of Physical and Chemical Constants. Mr. Hugh Moore, representing the National Research Council, appeared before our Council to solicit its endorsement, and it was made upon the recommendation of Prof. C. A. Adams, the new Chairman of the Engineering Division of the National Research Council.

The President reported that as the Society's representative he had attended several functions, including the conferring of the degree of Doctor of Engineering by Stevens Institute of Technology on M. Eugene Schneider, son of the late Henri Schneider, Honorary Member of the Society.

A question of the payment of dues of members in foreign countries under the present rates of exchange was referred to the Joint Finance Committee of the Founder Societies. The present By-Law remitting dues of members in active service was ordered rescinded, except for those men still overseas.

The Committee on Meetings and Program reported that the date of the Spring Meeting had been set for May 24-27, at St. Louis.

Interpretations of the Boiler Code Committee, passed at the meeting of that Committee on October 24, were approved.

Besides the other regular business of the Council, actions were taken to discharge with thanks the Committee on Increase of Membership and the Committee on War Industries Readjustment, and to continue the Committee on Code of Ethics. The President was empowered to appoint representatives of the Society to the second conference on Public Works to be held in Washington beginning January 12, 1920.

At the above meeting there were present: President M. E. Cooley, presiding; Vice-Presidents John Hunter, Spencer Miller, Max Toltz, Fred R. Low, Henry B. Sargent; Managers Robert H. Fernald, William B. Gregory, D. Robert Yarnall, Charles L. Newcomb, Charles Russ Richards, Frank O. Wells; Past-Presidents James Hartness, Ira N. Hollis, Charles T. Main; Chairmen of Standing Committees of Administration: Dexter S. Kimball, Chairman Committee on Meetings and Program; George A. Orrok, Chairman Committee on Publication and Papers; S. D. Collett, Chairman Committee on Membership; and Calvin W. Rice, Secretary.

DECEMBER SECOND

The regular December meeting was held on December 2, and there were present: M. E. Cooley, President, presiding; Vice-Presidents Spencer Miller, Fred R. Low, Henry B. Sargent, John A. Stevens; Managers Robert H. Fernald, William B. Gregory, D. Robert Yarnall, Charles L. Newcomb, Charles Russ Richards; Past-Presidents James Hartness, D. S. Jacobus, Ira N. Hollis, Charles T. Main; Chairmen of Standing Committees of Administration: A. E. Forstall (Acting, Finance Committee), D. S. Kimball (Committee on Meetings and Program), George A. Orrok (Committee on Publications and Papers), S. D. Collett (Committee on Membership), D. Robert Yarnall (Committee on Local Sections), Ira H. Woolson (Committee on Constitution and By-Laws). By invitation, President-Elect Fred J. Miller, I. E. Moultrop, Society's representative on the United Engineering Society, and Charles Whiting Baker, Society's representative on Engineering Council, Henry Hess, Standing Committee on Standardization, and Worcester R. Warner, and Calvin W. Rice, Secretary.

In the spirit of the recommendation of the Committee on Aims and Organization that tenure of officers on special committees be limited, a new Committee on Committees was appointed to consider and report back to the Council. This Committee consists of D. S. Kimball, chairman of Meetings and Program Committee for 1919; Arthur M. Greene, Jr., chairman of Research Committee for 1919; F. R. Low, chairman of the Power Test Codes Committee; D. S. Jacobus, chairman of Executive Committee of the Boiler Code. President Cooley was appointed chairman of this Special Committee.

The important question of admission of women to membership was taken up and on the legal opinion of the counsel of the Society and the recommendation of the Committee on Constitution and By-Laws, the Committee on Membership was instructed to hereafter consider applications from both sexes without distinction.

On the recommendation of a special committee appointed to investigate, the Council voted that it was inadvisable for the Society to acquire membership in any other society or organization, such as Chambers of Commerce, National Industrial Conference Board, etc.

Reports were received from the representatives of the Society on committees engaged in the joint activities of the Founder Societies including United Engineering Society and Engineering Council.

The Council approved the formation of professional sections and authorized a Committee to report on the proper organization, the policy, the fields of activity and the financial aspects of conducting the work of professional sections. President Cooley and President-elect Miller were to appoint the Committee and they themselves be members.

On the application of the Committee on Local Sections for additional appropriations, the Council voted to transfer funds available from the appropriation to the Increase of Membership Committee, discharged the previous day, and to take the remainder from surplus. The Local Sections Committee require $3800 additional for the first six months.

The preliminary report of the Sub-Committee of the Boiler Code Committee on Air Tanks and Pressure Vessels was received and ordered printed in Mechanical Engineering for discussion. Typographical corrections were approved to interpretations 186, 228, 255 and 260.

December Fifth

This was the first meeting of the statutory Council for 1920 and was held on the adjournment of the Fortieth Annual Meeting.

President M. E. Cooley called the meeting to order at 2 P. M. and introduced the new President, Major Fred J. Miller, the new Vice-Presidents, J. R. Allen, R. H. Fernald; and the new Managers, E. C. Fisher, D. S. Kimball, E. F. Scott, and L. E. Strothman.

There were also present: Vice-Presidents Fred R. Low, Henry B. Sargent; Managers D. Robert Yarnall, Charles L. Newcomb, and Charles Russ Richards; Past-Presidents D. S. Jacobus, Ira N. Hollis, and Charles T. Main; S. D. Collett, Chairman of the Committee on Membership; and Calvin W. Rice, Secretary.

Dr. W. F. M. Goss, Society's representative on the Engineering Foundation, and General Tracy C. Dickson were also present by invitation.

General Dickson requested that the Council take such action as it deemed advisable to secure for the Ordnance Department of the United States Government an organization which would enable it, in event of another war, to have the proper personnel. A committee of three was appointed, the President to be a member, to consider and report back.

The Council received and adopted a recommendation from the Annual Meeting that a committee of five members be appointed on the subject of Industrial Relations and authorized the President to appoint the committee, to study and report back to the Council what part of this Society should take in this question. The resolutions from the Annual Meeting are published in a separate article.

The Council received the names of the members elected by the Annual Meeting on the regular Nominating Committee for 1920. These names are given in a separate article in this issue, which also reviews the evolution of the election of this Committee by the voting membership.

The report of the Joint Conference Committee of the Founder Societies recommending a scheme of organization of the engineering profession was received from the Annual Meeting and the Society's four representatives on this Committee were reappointed to serve until the expiration of this Council. Our representatives on the Joint Committee are L. C. Marburg, D. S. Kimball, L. P. Breckenridge and E. S. Carman.

Appointments were made on the Joint Activities. E. G. Spilsbury was reappointed on the Board of Trustees of the United Engineering Society; President Miller, Charles T. Main and Arthur M. Greene, Jr., were appointed on Engineering Council; Henry B. Sargent was elected on the John Fritz Medal Board of Award; Charles Whiting Baker was reappointed as the representative of the Society on the Western Society of Engineers, Committee on Washington Award; Ira N. Hollis and Lewis Gustafson were appointed as Honorary Vice-Presidents to represent the Society at the St. Louis meeting of the American Association for the Advancement of Science, December 1919.

A Student Branch at Lafayette College was approved.

The Chairman of the Committee on Local Sections reported that the Local Sections delegates to the Annual Meeting had organized and appointed a Chairman and Secretary.

Amendments to the By-Laws presented for first reading at the regular meeting at Indianapolis passed final action. These included amendments to change the words "The Journal" to "Mechanical Engineering," also the By-Laws, and to change the subscription price of this publication. The Committee on Constitution and By-Laws also gave notice of the following amendment to By-Law 27 to be in effect for 1920 only and to legalize the action of the Society at the Annual Meeting to elect the Nominating Committee for that year:

> The nomination of the members of the Nominating Committee for the year 1920, made by the delegates of the Local Sections at their session commencing December 2, 1919, shall, if unrevoked, be a sufficient nomination of such committee by said delegates within the intendment of these By-Laws.

Calvin W. Rice,
Secretary.

Notes of the Month

On the recommendation of the American Society of Civil Engineers, the Four National Engineering Societies are considering a scheme for the publication of a professional directory of engineers.

Dr. Ira N. Hollis and Professor Lewis Gustafson will represent the Society at the Seventy-Second Meeting of the American Association for the Advancement of Science to be held in St. Louis from December 29, 1919 to January 3, 1920.

The Second Conference of the establishment of the National Department of Public Works is to be held in Washington, D. C., beginning on January 13. Seventy organizations were represented in the first conference, which was held in Chicago, and it is expected that practically all of these will again send delegates. The Society has appointed Mr. Charles Whiting Baker, one of its representatives on Engineering Council, to act as honorary vice-President and represent the Society on the occasion; and President Miller is calling on the Local Sections to respond to the invitation of Mr. M. O. Leighton, chairman, and send delegates to the Conference.

The Committee on Committees, authorized by the Council to make a study of the special committees of the Society, will welcome suggestions from any member on the conduct of the committee work.

All members who have not done so are invited to send in discussions of the report of the Joint Conference Committee of the Founder Societies. This report, together with that of our own Committee on Aims and Organization was mailed to the entire membership in advance of the Annual Meeting. A synopsis of the discussion of the two reports is being printed elsewhere in this issue.

In a recent compilation of the members of the four national socieities in the Metropolitan District made by the Engineering Council for the purpose of addressing an appeal for funds, it was found that less than 4½ per cent were duplicates. In this district there are only four men who hold membership in all four societies.

President Winchell and Secretary Stoughton of the Mining Engineers are out on a trip to the coast in the interest of the development of their organization.

The standardization of shafting sizes has been very thoroughly considered by the Society's Committee appointed about a year ago, and the Committee is to submit its report at the January meeting of the Council. This report will recommend a list of standard sizes for transmission shafting, and a second list of standard sizes for shafting used in machinery manufacture.

As stated in a recent issue of Mechanical Engineering a meeting of the Commission for an International Standard Pipe Thread was to have been held on November 10, 1919. This date was changed to January 12, 1920. In the meantime the Society's Committee on International Standard for Pipe Threads working in coöperation with a committee of the American Gas Association and assisted by the Committee of Manufacturers on Standardization of Fittings and Valves worked energetically to prepare material to present in a satisfactory and convincing form the American Standard Pipe Thread to the International Commission. At the suggestion of the joint committee a manual on American standard pipe threads was prepared and printed in pamphlet form by the Manufacturers Committee. This manual contains a

brief history of the standard, full notes on its technical features and a large number of sketches and tables giving the dimensions and tolerances of the standard threads for various sizes of pipe.

The Society's Committee on Protection of Industrial Workers is to hold a meeting on January 5, at which time it expects to take final action on the Elevator Code which it has been developing for a number of years. The Committee plans to distribute printed copies of this code quite generally for suggestions and criticisms before it is submitted to the Council.

Sponsorships under the American Engineering Standards Committee. At a recent meeting of this committee, the Society was requested to act as sponsor or joint sponsor in the forming of a Sectional Committee to develop standards for Ball Bearings; Small Tool and Machine Tool Elements; Plain Cylindrical Limit Gages; Nuts and Bolt Heads; Spur, Bevel, Worm and Sprocket Gears. The Standardization Committee has considered these requests and the correspondence which prompted them, and has decided to recommend to the Council the acceptance of sponsorship in each case.

On Housing the Annual Meetings

Those who planned the Engineering Societies Building little thought that within a few short years the spacious facilities of the building would grow to be inadequate, but it is a fact, that our Annual meeting seriously taxed these facilities and especially at the Annual Reunion on the Thursday night of the Convention, so much so that it is a question whether the Society can continue to hold all the functions of the Annual Meeting within the walls of the one building. The figures of those who registered have not yet been compiled to show the proportion of out-of-town members and guests to those residing in New York City, but there was certainly a very large registration from out of town, and if only one-fifth of the New York members came to the meeting their delegation of 500 would be no small proportion of the total of 2200 registered. The contingency of practically every member from New York attending has never yet had to be met, but with the interest in the Annual Meetings increasing each year, this too may not be an impossibility; in which case, the holding of a convention within the Engineering Societies Building would of course be entirely out of the question.

From now on, the Committee on Meetings and Program will be confronted with quite a problem in handling the Annual Meeting, and it would not be out of place to invite suggestions from members, especially those who enjoyed the experience of the convention just held, as to how the problem can be met. In discussing this question, we should bear in mind that the Spring Meeting is becoming of greater interest and importance and certain features of the Annual Meeting might logically be referred to the out-of-town convention. Also, the Society has successfully inaugurated a policy for joint meetings of the Local Sections.

Let us contemplate the conditions when we have 20,000 members (the membership is now around the 12,000 mark and at the present rate of increase, we shall reach the 20,000 mark by about 1924); when we have Local Sections in every state and city in the country (we have 31 sections now), and when the business before the Society becomes so voluminous by virtue of constantly increasing activities that we may have to have administration offices in cities other than New York.

Prizes to be Awarded by the Society

The Committee on Relations with Colleges will consider papers prepared by junior members and by members of the student branches respectively and will recommend to the Council the following awards:

1 The Junior Prize of $50 and an engraved certificate for the best paper by a Junior member received before June 30, 1920.

2 Two Junior Prizes of $25 each and an engraved certificate for the two best papers by members of Student Branches presented before June 30, 1920.

Papers for these competitions are solicited and will be adjudged from the standpoints of originality of matter, applicability, value as contributions to mechanical engineering literature, logical development of contents, conclusiveness, completeness, and conciseness.

Further particulars of these awards will be published in the 1920 Year Book, which will be issued early in the year, and such information may also be obtained upon application to the Secretary.

Conference on Professional Employment

A conference on a nation-wide professional employment service will be held in the Engineering Societies Building on January 9 and 10. This conference is called to discuss the exact status of professional employment work in this country and to consider the desirability of a nation-wide professional employment service for men and women on a non-governmental basis.

This conference is the outgrowth of an action taken in Chicago, on October 23, that:

"The Executive Committee of the National Committee of Bureaus of Occupations shall constitute a committee with additional members-at-large to invite a group of professional men interested also in the employment of professional workers, to meet in joint conference for the discussion of the advisability of establishing a chain of offices and for the formulation of an immediate program."

Amendments to the Constitution and By-Laws

Amendments to the Constitution as proposed by the Committee on Aims and Organization at the last Spring Meeting in Detroit were presented for discussion at the Annual Business Meeting. Practically no change was ordered by this meeting and the status of the amendments is now that they will be sent out for letter ballot on March 1.

Anticipating these constitutional amendments, the Committee on Constitution and By-Laws has been studying the By-Laws and will be ready to make recommendations to the Council of amendments when necessary.

The Committee on Constitution and By-Laws has also been actively engaged in bringing the By-Laws up to date, and has recommended to the Council several slight but necessary changes.

Details of these amendments would take considerable space and instead of publishing them here, they will be given completely in the Year Book for 1920, which will contain the Charter, Constitution, By-Laws, Rules and Index.

Professional Sections

An amendment to the Constitution is before the Society to create a Standing Committee of Professional Sections. Pending action on this amendment, the Council has approved the policy of inaugurating Professional Sections and has authorized a Special Committee to report on the various aspects of such an organization such as local work, finances, meetings, etc.

The new policy is in line with recommendations of the Committee on Aims and Organization and is intended to provide for those groups of men in the Society who are interested in particular subjects and may therefore be subdivided professionally in the same way that the Local Sections groups provide a geographical subdivision of the membership.

Many organizations have developed such an activity to a high degree and in one or two instances the groups have been emphasized more than the geographical groups. For some time there has been a feeling in our own Society that this kind of an organization should be provided, and in fact three years ago when elaborate by-laws were prepared for the Local Sections the opportunity was utilized of drawing up similar by-laws for Professional Sections. These by-laws have already been adopted (B47a-h) and pending the formulation of the recommendations of the Special Committee on Professional Sections to study the subject they may be consulted by members who are interested in the development of this new activity.

Suggestions on any phases of the subject will, of course, be gladly received by the Special Committee.

Recommendations on the Policy of the A. S. M. E.

As Made by Their Committee on Aims and Organization; and on Engineering Organization as Contained in the Joint Conference Report of the Four Founder Societies

ONE of the main features of the Annual Business Meeting of The American Society of Mechanical Engineers was a discussion of basic recommendations on the policy of the Society as contained in the report of its Special Committee on Aims and Organization which has been working over a period of sixteen months. These recommendations were supplemented by a report of a "Joint Conference Committee" of the four Founder Societies, organized this summer to coördinate similar recommendations on policies formulated by special committees of the other three societies and to make recommendations on organization in general.

The Society's Committee on Aims and Organization was composed of members from all its Local Sections with a few members-at-large, and the original recommendations of this Committee were presented to the Society at its Spring Meeting in Detroit, Mich., June 1919, and were there accepted with certain amendments. These original recommendations and the discussion thereon were published in Mechanical Engineering, July 1919, page 601. Subsequent to this discussion, the Council of the Society requested the Committee to present its final recommendations, which was done, and the report was referred to the Annual Business Meeting as stated above. The status of the report is now that the Council will discuss ways and means of putting the final recommendations into effect. A similar procedure will apply to the Joint Conference Report, this Society acting in unison with the other three societies.

Changes in the Committee's Recommendations

The final Report of the A. & O. Committee distributed at the Convention followed the form of the preliminary report as published in Mechanical Engineering in July last, with the same paragraph numbers as the preliminary draft, except that explanatory paragraphs were omitted. The omitted paragraphs are Nos. 3, 5, 13, 14, 23-26, inclusive, and 45-51, inclusive. The wording of the paragraphs in the final report is that of the previously published report, except in Pars. 16 and 32. With regard to Par. 16, having to do with the development of Mechanical Engineering, the Committee say:

The Committee is unwilling to accept the modification (proposed by the Spring Meeting) and has returned to the intent and phraseology originally offered. There are two reasons for taking this position: First, discussion of this resolution in the business meeting at Detroit did not turn on the merits of the proposal, but was unfortunately, and the Committee believes improperly, directed toward the financial aspects of more frequent publication of Mechanical Engineering. The Committee advisely recommended the change at *the earliest possible date*, realizing that the financial aspects involved would have to be carefully considered by the Council.

The action of the Spring Meeting on Par. 32, having to do with the creation of a national agency representative of local groups, state groups and national societies, fully empowered to act and speaking in the name of the engineering profession, was also not accepted by the Committee, which commented as follows:

The Committee is unwilling to accept this modification and has returned to the intent and phraseology originally offered.

It takes this position because its recommendation is in line with that of the other three national societies and has recently been endorsed by the Joint Conference Committee.

Discussion of the Report

The report was considered section by section, being presented by the Chairman of the Committee, L. C. Marburg, and occasioned no discussion until Harrington Emerson read a written discussion of Par. 10, in which he objected to the inclusion of Industrial Engineering as a major technical subject for consideration by the Society.

In presenting Par. 12, Mr. Marburg said he wished to emphasize the fact that it recommended active interest of the Society in vocational training not only in shops for a particular kind of engineering work, but with the possibility of securing systematic coöperation between industry and institutions of industrial education formed by municipalities or states. He called attention to what had been done along these lines abroad, and to the fact that in Connecticut and in Wisconsin, and possibly in some other states, the laws provided that boys should be given instruction in the theoretical aspects of their work.

Ira Dye[1] expressed his approval of the recommendation, but Harrington Emerson took the stand that this was the educator's business and not the Society's. L. P. Breckenridge[2] contended that the engineer could no longer deal exclusively with materials and machines, but must also include men. Arthur L. Williston[3] said that educators had been trying to get the coöperation of the industries in vocational training for the past ten or fifteen years, and had found it difficult. The engineer, he thought, ought surely to appreciate the need of this training and of coöperation to obtain it. H. H. Suplee[4] gave James Nasmyth's definition of mechanical engineering as common sense applied to materials, and suggested that if this definition was accepted it would cover all the points of the paragraph under discussion. Fred J. Miller,[5] L. S. Randolph[6] and A. A. Reimer[7] also spoke in favor of the recommendation, which after being duly considered was favorably voted upon.

Discussing Par. 12, C. E. Brooks[8] wrote that he considered industrial education below the grade of college work one of the most important questions facing the public, and gave the following reasons:

a It assists the youth to decide definitely concerning his aptitude for industrial work

b It enables the authorities to offer additional educational advantages to those who show adequate proficiency

c It enables the industries to obtain men already prepared in the rudiments of industrial training

d It provides universities with a class of men bent upon the definite objective of industrial development work

e It provides the people at large with a rudimentary knowledge of the basic principles of industry, so that in crises they will be better able to overcome the difficulties of the industrial situation.

Commenting upon Par. 17, which recommends some less expensive method of publishing Transactions, the Secretary announced that the Publications and Papers Committee had arrived at no conclusions. He said that the American Institute of Mining and Metallurgical Engineers were planning to enclose the unfolded sheets of their Transactions in the monthly bulletin so that they could be bound at the individual expense of the members as desired.

Speaking with reference to Par. 20 on the Engineering Societies' Employment Office, the Secretary said:

Our Society has maintained an Employment Service for a quarter of a century. Just a year ago the Engineering Societies' Employment Bureau was organized and it is functioning well. Each of the societies is now contributing in excess of $250 a month to the support of the joint Bureau.

In the employment activities, the National Societies have, by inference, in the popular mind, not been doing as much as they should. The consequence is that there seemed to be a place for the American Association of Engineers. It is interesting to compare their activities

[1] Asst. Gen. Mgr., Weir Frog Co., Norwood, Ohio.
[2] Professor of Mechanical Engineering, Sheffield Scientific School, Yale University, New Haven, Conn.
[3] Principal, Wentworth Institute, Boston, Mass.
[4] Cons. Engr., 409 Riggs Bldg., Washington, D. C.
[5] Center Bridge, Pa.
[6] Cons. Engr., Blacksburg, Va.
[7] Community Director, Air Nitrates Corp'n., Muscle Shoals, Ala.
[8] Superintendent of Motive Power, Grand Trunk Pacific Railway, Transcona, Man

with ours. The following is a comparison over a recent three-months' period:

	A. A. E.	Eng. Soc. Emp. Bureau
Positions received	1084	946
Applicants introduced	2985	5909
Members placed	264	371

In presenting Pars. 27 to 33, Recommendations Concerning National Organization, L. C. Marburg urged a greater activity by engineers in public affairs. It was not a question of the individual vote of the engineer as a citizen, but his influence as a member of an organized profession in the solution of problems requiring the training and education of experts which would count for most in effective government. He said that groups of men of special training such as engineers should organize and make their influence felt. As to organization, the Committee felt that as most problems were local, the organization should be along local lines, forming state groups from these and a national organization in which the state groups would be represented. This national organization would also include representatives of the National Societies.

Report of the Joint Conference Committee

In order to clarify the discussion which took place regarding the Recommendations Concerning National Organization, Pars. 27 to 33, and the remaining paragraphs of the Report of the Committee on Aims and Organization on Recommendations Concerning Activities of a National Organization, it will be necessary to give a synopsis of the Report of the Joint Conference Committee, which has heretofore not been published in MECHANICAL ENGINEERING.

The conferrees representing The American Society of Mechanical Engineers on the Joint Committee were Louis C. Marburg, Chairman; Edwin S. Carman, Dexter S. Kimball. L. P. Breckenridge was added later.

The report is divided into two parts, that covering public activities and that covering society activities of common interest to the four Founder Societies. Only a few of the most important sections of the report are treated in this synopsis, which immediately follows.

1 COÖPERATION IN PUBLIC ACTIVITIES

It was the unanimous opinion of those present at all conferences that one of the most important matters on which joint action can be taken is the formation of a single comprehensive organization to secure united action of the engineering and allied technical professions in matters of common interest to them.

In presenting its report upon a proposed form of organization which shall provide a voice to speak for the ideals of the profession, a hand to enforce unity of action and render the maximum of national, social and political service, the Committee presents for consideration the following plan.

In preparing this plan the Committee has recognized that there exists in Engineering Council a tool which is engraving an honorable record on the pages of professional history, but its limitations are well known and its poverty is chronic. If desired, Engineering Council can be molded into this organization by making it more democratic and founding it on direct representation of all engineers, rather than on appointment as at present.

Every new activity, to be effective, means work and needs money. A movement such as proposed, if undertaken without sufficient funds, would not only prove barren of results, but by failure would bring ridicule upon the profession. In advance of its organization no definite budget can be prepared. The revenues proposed are moderate, and are based on the experience of Engineering Council, which, while called upon to occupy an ever-widening field, has been continually handicapped by limited resources.

In submitting the proposed fundamentals to govern a single comprehensive organization by which the engineering and allied technical professions may become more active in their service to the public and themselves, the Joint Conference Committee would point out the following as among some of the objects to be attained by such an organization:

1 To render the maximum of service to the nation through unity of action

2 To give the engineers of the country a more potent voice in public affairs

3 To secure greater recognition of the services of the engineer, and to provide for his advancement

4 To promote *esprit de corps* among the members of the profession

5 To provide the machinery for prompt and united action on matters affecting the profession, among which are:

- Licensing and registration of engineers
- National Service Committee
- National Department of Public Works
- Conservation of national resources
- Publicity
- Classification and compensation of engineers
- General employment bureau
- Engineering Education
- International affiliation of engineers
- Industrial relations.

National Engineering Organization

Component Parts of Organization. 1 Local Affiliations, preferably under the auspices of local engineering societies or clubs, as follows:

a "Local Associations" or "Sections" of the national engineering or technical societies;

b Local engineering societies; and

c Other local engineers and members of allied technical professions and associates.

2 A National Council, consisting of representatives of national engineering and technical societies and of representatives of local, state or regional affiliations or organizations.

The formation of State Councils, composed of representatives of the local affiliations within the State or otherwise representative of the majority of the engineers and members of allied technical professions in the State, is desirable as conducive to coöperation and to further the objects of the National Council with which such State Councils should harmonize; and such State Councils are recommended wherever and whenever the local conditions warrant.

National Council

Purposes. The National Council is created to consider national matters of public welfare with which the engineering and allied technical professions are concerned, as well as other matters of common interest to these professions, in order that united action may be possible in matters of national scope.

Basis of Representation. Each local, state or regional affiliation or organization whose membership is not otherwise represented than through the national engineering or technical societies, shall be entitled to one representative to the National Council for a membership of from 100 to 1000 inclusive, and one additional representative for every additional 1000 members or major fraction thereof.

Each national engineering or technical society shall be entitled to one representative for a membership of from 200 to 2000 inclusive, and an additional representative for every additional 2000 members or major fraction thereof.

Executive Board. There shall be an Executive Board which shall direct the activities of the National Council in accordance with its adopted policies. It shall have such other functions as may be assigned to it by the National Council.

The Executive Board shall consist of the four officers elected by the National Council and one representative for each national society of 2000 members or less, with one additional representative from each national society for every additional 2000 members or major fraction thereof, to be selected from the membership of the National Council in each case by the national society concerned, and of a number of representatives selected from the membership of the National Council by the representatives therein of the local, state or regional affiliations or organizations, the said number to bear the same ratio to the representation of the national societies as the total membership of the local, state or regional affiliations or organizations bears to that of the national societies; provided that the numerical basis of representation shall be so changed from time to time that the membership of the Executive Board shall not exceed thirty (30).

The President and Secretary of the National Council shall be the Chairman and Secretary, respectively, of the Executive Board.

2 COÖPERATION IN SOCIETY ACTIVITIES

Coöperation in Professional Activities. The Committee recommends that the growing coöperation in the activities of the Societies be fostered. The unified operation of the libraries, the organization of Engineering Council, American Engineering Standards Committee, Engineering Foundation and Employment Service, are conspicuous examples of such common action. Joint committees for definite purposes should be established, and standing or other committees directing similar activities in the several societies would profit by conference. In this way common action may be taken or similar policies may be adopted when advantageous, thus avoiding duplication of effort. Comprehensive means should be provided for united action in other large professional and technical matters.

Industrial Relations. The question of industrial relations is one of the most pressing issues of the present day. It is a vital factor in the economic future of the country. It is a matter with which the engineer is peculiarly fitted to deal. In view of the great importance of the subject, and of the unique relation of the engineer to industry, the Joint Conference Committee recommends that Industrial Relations

should be a major subject for the consideration of the engineering and allied technical professions. It is also recommended that support be given to educational movements, such as the Industrial Service of the Y. M. C. A. in colleges, the Americanization movement, and similar activities.

Student Organizations. The Committee recommends that it be the duty of local associations and sections of the National Societies to promote and assist general student engineering societies in neighboring universities and technical schools, to provide carefully selected speakers, and to maintain personal contact with such societies. In view of the desirability of more intimate coöperation among engineers, consideration of the affiliation of the student branches of the national societies into general student engineering associations is recommended.

The American Engineer in Foreign Service. It is the opinion of the Committee that American engineers in foreign countries should be urged to assemble for purposes of better acquaintance and mutual help, and to fraternize with the engineers of the country in which they reside, for the promotion of world-wide coöperation.

Standards. The Committee is unanimously of the opinion that the correlation of standards by the four societies and others working with them, along the lines contemplated by the American Engineering Standards Committee, should be approved in principle; but in view of the fact that this matter is under consideration by the Boards of Direction of those societies and the matter is well advanced, this Committee does not feel warranted in making a further recommendation.

Licensing and Registration of Engineers. The Committee of Engineering Council that has had under consideration the licensing and registration of engineers has nearly completed its draft of a standard form for a uniform law on these matters. Since it is undesirable to duplicate this work, the Joint Conference Committee recommends that action be deferred pending the receipt of that report.

Discussion on National Organization

In presenting the sections of the Report of the Committee on Aims and Organization dealing with National Organization and the Report of the Joint Conference Committee, L. C. Marburg said that the report represented the compromises which were necessary when representatives of the societies drew up a report to which they could all agree. The Committee recognized the infeasibility of preparing a perfect organization. The intention was to plan for an organization which would include half a million or more in its membership, every member anxious to contribute his share toward the common good. In transmitting its report to the Council, the Committee, he said, had asked first for the approval of the general characteristics and recommendations of the report, and second that the Council pass a resolution asking the Joint Conference Committee, or a similar constituted body, the other three societies concurring, to take the necessary steps to bring the recommendations into effect.

C. E. Brooks wrote that he considered every one of the recommendations of vital importance to the engineering profession, particularly Par. 31 of the report of the Committee on Aims and Organization, for the reason that he thought the engineering profession was receiving no national or industrial recognition. Its members, he said, when appointed to public office are often subject to the whims of politicians because engineers are unsupported by any organization which puts industry and progress first.

A. E. Van Ness expressed his approval of the work of the Committee as did Augustus Smith,[1] Ira Dye and Henry Hess. Morris L. Cooke[2] expressed the wish that the report had been that of a single representative conversant with the traditions and aims of all the societies and the ideas of representative engineers, rather than a compromise arrived at in a committee representing the four societies. He thought that the fundamental basis for the enthusiasm necessary to make a success of the national organization was lacking. He also criticised the machinery of representation on the proposed council.

Robert Sibley[3] told how an organization of engineers similar to that proposed had been worked out in California, its organization proceeding from the smaller individual groups to larger combinations as the need for combined action presented itself.

Charles Whiting Baker[4] reviewed previous attempts on the part of the societies to form a combined organization. As an example of the value of coöperative effort among members of the engineering profession he cited the reinstatement of some 350 engineers in the employ of the Rapid Transit Commission of New York City who lost their positions without notice. He said that he was not concerned about the details of the organization as he had faith in the ability of the Council of the Society to settle such matters, the great thing was coöperation among the engineering societies for the common good. Dexter S. Kimball and E. S. Carman spoke along similar lines, saying that the document was far from being perfect, but that the national organization was necessary and important.

Among those also taking part in the discussion were A. L. Williston, G. J. Parsons, Malcolm Libby, L. P. Alford, A. E. Walden, S. L. Castle, L. D. Burlingame, L. W. Wallace, and L. P. Breckenridge.

At the conclusion of the discussion of the recommendations, it was voted to accept the report of the Committee and to request the Council to appoint a committee in concurrence with the other Societies represented in the report to put its recommendations into effect.

[1] Pres., Bergen Point Iron Works, Bayonne, N. J.
[2] Cons. Engr., Finance Bldg., S. Penn Sq., Philadelphia, Pa.
[3] Editor, *Journal of Electricity*, Crossley Bldg., San Francisco, Cal.
[4] Pres., Baker Economic Transport Corpn., New York, N. Y.

LOCAL SECTIONS CONFERENCE

At the Sections Conference held during the Annual Meeting, the following Sections were represented by the delegates indicated:

Atlanta, W. J. Neville
Baltimore, W. W. Varney
Birmingham, Paul Wright
Boston, D. K. Dean
Buffalo, C. A. Booth
Chicago, G. R. Brandon
Cincinnati, J. T. Faig
Cleveland, C. H. Day
Colorado, T. L. Wilkinson
Connecticut, C. K. Decherd
Detroit, F. H. Mason
Eastern, N. Y., R. O. Alden
Erie, R. C. Stevens
Houston, H. W. Fletcher
Mid-Continent, H. P. Porter
Minnesota, H. S. Whiton
New Orleans, W. B. Moses
New York, G. K. Parsons
Ontario, R. W. Angus
Oregon, S. H. Graf
Philadelphia, L. H. Kenney
Rochester, V. M. Palmer
St. Louis, L. C. Nordmeyer
San Francisco, Robert Sibley
Washington, G. A. Weschler
Washington State, E. O. Eastwood
Worcester, H. P. Fairfield

At a meeting of the Committee on Local Sections held on November 30, the matter of increased appropriations for Sections was carefully discussed, and a committee made up of Messrs. J. T. Faig (Cincinnati), W. C. Brinton (New York), L. H. Kenney (Philadelphia), W. H. Kenerson (Providence), and Charles Russ Richards (Urbana, Ill.), was appointed by the Chairman of the Committee on Local Sections to make recommendations as to what change, if any, should be made in the present formula upon which appropriations to sections are made.

This committee reported in favor of an increase in formula for appropriations to $100 plus $1.25 per member; and this recommendation was presented to the Council the following morning by Mr. Yarnall, Chairman of the Committee on Local Sections. A special committee was appointed by the Council to confer with the Finance Committee and learn whether it would be possible for the Society to appropriate funds to meet the increased amount necessary if the appropriation recommended by the Committee on Local Sections was approved by the Council. It was found as a result of this conference that the unappropriated funds of the Society do not, at present, permit such an increase; but it is possible that about the first of April the actual income of the Society will be sufficiently in excess of the present estimated income to warrant the Council in allotting the additional amount.

Nominating Committee

At the Sections' Conference on December 2, the first item of business taken up was the selection of a Nominating Committee. This was authorized by Messrs. Parker and Aaron, legal counsel

of the Society, in lieu of any By-Law to govern the procedure as called for by paragraph C48 of the Constitution as amended last Spring. The Committee on Local Sections turned the meeting over to the delegates, who proceeded to elect C. A. Booth as Chairman. The Conference then approved the division of the Sections' delegates into seven groups, as follows:

(1)	Boston	628	
	Worcester	170	
	Connecticut	528	
	Eastern N. Y.	132	
	Philadelphia	739	
	Baltimore	131	2328 members
(2)	New York	2650	2650 members
(3)	Washington	186	
	Virginia	74	
	Atlanta	50	
	Birmingham	58	
	New Orleans	48	416 members
(4)	Rochester	57	
	Ontario	80	
	Buffalo	162	
	Erie	35	
	Cleveland	365	699 members
(5)	Detroit	331	
	Milwaukee	131	
	Chicago	594	
	Indianapolis	93	
	Cincinnati	194	1343 members
(6)	Minnesota	103	
	St. Louis	114	
	Mid-Continent	112	
	Houston	63	
	Colorado	59	451 members
(7)	Washington	59	
	Oregon	24	
	San Francisco	192	
	Los Angeles	97	372 members

An adjournment was then taken, during which the delegates from these groups agreed upon the selection of members of the Nominating Committee. In order to conform with the recommendation of the Committee on Aims and Organization, and the wording of paragraph C48 of the Constitution, the Chairman of the Sections' Conference, Mr. Booth, was directed to report this action to the members of the Society at the business meeting on December 3. This was done, and the members of the Nominating Committee and alternates so selected were formally approved, as noted on page 11 of Section Two.

The afternoon session of the Sections Conference was devoted to a presentation of the report of the Committee: "Five Years of Section Activity," which will appear in a subsequent issue of MECHANICAL ENGINEERING. Each of the delegates submitted a written report regarding the activities of his Section, and gave a brief outline of the activities. This interchange of ideas is always very helpful to the officers of our Sections.

The Council, at its meeting on December 1, passed the following resolution regarding the Increase of Membership Committee:

VOTED, That the Increase of Membership Committee be discharged and that a vote of thanks be given this Committee for the work it has done.

VOTED, That the work now done by the Committee on Increase of Membership can best be handled by the Committee on Local Sections, and that the appropriations formerly made to the Increase of Membership be now made to the Committee on Local Sections.

Therefore the work of the Committee on Increase of Membership now devolves upon the Sections, and in the development of the new organization to take care of this activity, each Section has been requested to appoint a local Increase of Membership Committee to take charge of this work. A few of the Sections have already taken such action, and reported the personnel to headquarters.

The suggested scheme of organization is that one member of the Committee on Local Sections act as Chairman of the national work on Increase of Membership, and that similarly one member of the Executive Committee of each Local Section act as Chairman for this activity in the territory of his Section. He might be given, under the general approval of the Executive Committee of the Local Section, power to appoint a Committee of whatever size he deems necessary to assist him in this work.

These committees should be appointed at once, and hold meetings to decide upon the plan of campaign which they wish to conduct, determine upon the literature to be prepared, etc.

Sections Meetings

ATLANTA:
November 24. Dinner and address by Dean Dexter S. Kimball, A Broader Field for the Engineer.

BALTIMORE:
November 13. The Treatment of Wastes in the Canning Industry, by Dr. J. H. Shrader, U. S. Department of Agriculture.
Some Problems of the Canning Industry, by J. C. Talliaferro, Continental Can Company.

BOSTON:
November 19. 2.15 P. M., Excursion to the Hood Rubber Co.
6.15, Dinner at Harvard Union.
Addresses: Employee and Service Department of Hood Rubber Co., by R. S. Quinby.
Rubber from the Crude to the Manufactured State, stereopticon illustrations, by Alfred A. Glidden, Genl. Mgr., Hood Rubber Co.
Discussion: Shall the Engineer be Licensed?

BUFFALO:
October 14. Manufactured Weather, by J. E. Bolling.
November 18. Peace Memorial Bridge, by Messrs. Eckert and Bagley.

CHICAGO: (Joint meeting with A.I.E.E., I.E.S., and W.S.E.)
November 24. Industrial Economics.
Personal Efficiency of the Employee, by Harold Almert, Consulting Engineer.
Electrical Power as a Factor in Effecting Economies and Increasing Production, by George H. Jones, Power Engineer, Commonwealth Edison Co.
Reaction of Labor to Intensive Lighting, by Edwin W. Tillson, Testing Engineer, Commonwealth Edison Co.
November 21. Successful Methods of Improving Human Relations, by Charles V. Scribner, V. P. and Chief Engineer, Business Service Corporation.
Results of an Americanization Program, by Alexander D. Bailey, Asst. Chief Engineer, Commonwealth Edison Co.
Discussion: A National Department of Public Works.

CLEVELAND: (with C.E.S.)
November 25. The Open Court Trial of Patent Cases, by the Honorable W. L. Day.

COLORADO:
October 24. Dinner and addresses:
Building Marine Engines and Ship Machinery, One Mile Above Sea Level, by William Lester.
The Government's Preparation for Educating the Disabled Soldiers, by Professor J. A. Hunter.
November 28. Industrial Education in the Denver Public Schools, by Joseph Y. Parce.
Discussions on Industrial Democracy and Industrial Education.

CONNECTICUT:
HARTFORD BRANCH:
November 24. Precision Gages, by C. W. Weingar of the Precision Gage Laboratory, Pratt & Whitney Co., Exhibition.
MERIDEN BRANCH:
November 21. The Application of the Vacuum Tube to Radio Telegraphy, by Harold P. Donle, Radio Engineer, Connecticut Telephone and Electric Co.
December 19. Manufacture of Phonograph Records, by Fred L. Wood.

LOS ANGELES:
December 8. Address by A. H. Goldingham.

MINNESOTA: (with Student Br. of Univ. Minn.)
December 1. Problems Confronting Young Engineers, by Dean Lauder W. Jones.

NEW YORK:
November 26. Position of the Engineer in Modern Industry, by Charles Ferguson.

ONTARIO:
November 14. Dinner and address by General C. H. Mitchell.
December 18. Thirty Years' Progress in Boiler Construction in Canada, by N. Quesnal and James T. Lewis, John Inglis Co.

PHILADELPHIA:
November 25. Color Photography, by Henry Hess.
Smoker.
December 11. Oil as a Fuel, by Henry Thomas, Combustion Engineer, Sun Co., and E. H. Peabody, V. P., The Babcock & Wilcox Co.
(Joint meeting with A.S.H. & V.E.)

WASHINGTON:
November 20. War Inventions, by Colonel C. H. Hilton, War Invention Section, General Staff.
War Inventions and Their Application to Industry, by F. C. Colwell, Examiner, Patent Office.
Discussion: Department of Public Works.

WASHINGTON STATE:
November 24. Organization meeting, election of officers and adoption of a Constitution.

WORCESTER:
November 25. A National Department of Public Works, by Dr. George F. Swain, Harvard University.
December 16. Power, its Production and Distribution as applied to industrial plants, illustrated, by R. J. S. Pigott, Consulting Engineer, Bridgeport, Conn.

Dean Kimball's Visit to Atlanta

Dean Dexter S. Kimball visited the Atlanta Section on November 24. Twenty-one members of the Society met with him at dinner at the Hotel Ansley to discuss A. S. M. E. affairs. Later in the evening Dean Kimball addressed a meeting held under the auspices of the Affiliated Technical Societies of Atlanta on the subject of A Broader Field for the Engineer. The following day he went on to the Birmingham Section, where similar meetings were held. With his broad knowledge of Society activities, Dean Kimball was able to create much enthusiasm among the members in these two cities.

Nominating Committee for 1920

In the election of the regular Nominating Committee for the year 1920 by the Local Sections' conference at the Annual Meeting and in the confirmation of this election by the convention, the Society has taken the final step in a policy to secure absolutely democratic selection of the Nominating Committee.

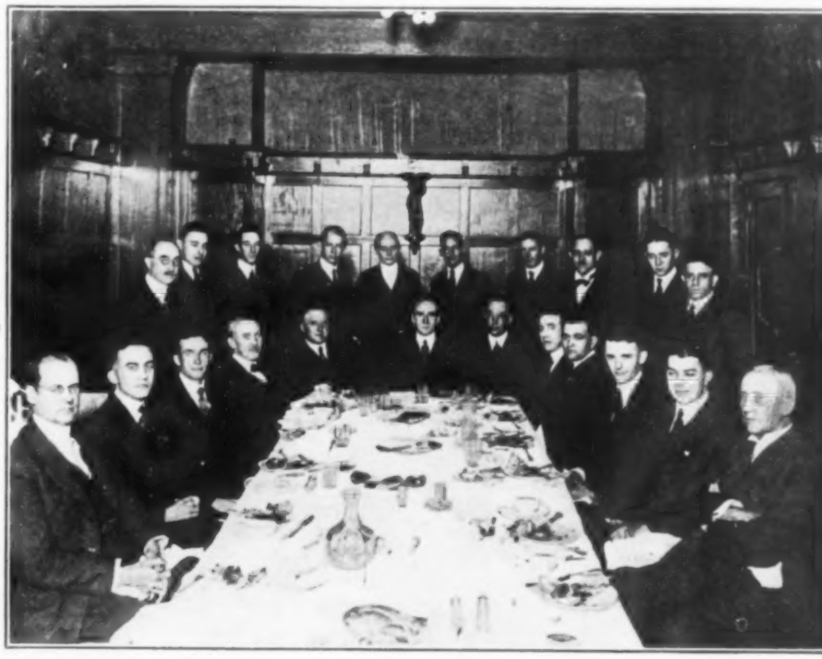
Members will recall the history of this profound change in the determination of the government of the organization. The first step was taken five years ago when the President decided to call on the Local Sections for suggestions of names from which to make his constitutional appointments on the regular nominating committee. The plan was so successful that the next step was taken to change the Constitution, making it mandatory for this nominating committee to be elected by the voting membership. The third step, and the most difficult one, has been to provide the machinery for this election, and in arranging for this it has been necessary to coördinate the ideas of the Committee on Local Sections, the Committee on Constitution and By-Laws, and the Committee on Aims and Organization, all of whom have had special charges from the Council to take up this manner of election.

The final opinion of these three Committees was embodied in a resolution presented by the Committee on Aims and Organization at the Spring Meeting last June and referred by the Council to the Annual Meeting and accepted by that Meeting. Meanwhile, the old By-Law detailing the manner of appointing a Nominating Committee by the President having become obsolete through amendment of the Constitution, a legal opinion was obtained as to how the Nominating Committee for 1920 could be elected pending the time when the resolution of the Committee on Aims and Organization could be framed into a permanent By-Law. The opinion was that the Local Sections delegates at the Annual Meeting could take action and elect the Nominating Committee for 1920, and that this action if unrevoked could be framed into a special By-Law to be passed by the Council. This By-Law is now before the Council for consideration and reads as follows:

> The nomination of the members of the Nominating Committee for the year 1920 made by the delegates of the Local Sections at their session commencing December 2, 1919, shall, if unrevoked, be a sufficient nomination of such committee by said delegates within the intent of the By-Laws.

The action of the Society at the Annual Meeting was to confirm the names recommended by the Local Sections delegates and, therefore, to appoint the following committee for 1920:

	Group Sections	Committee 1920	Alternates
1	Boston, Worcester, Connecticut, Philadelphia, Baltimore, Eastern N. Y.	H. P. Fairfield, Worcester	W. W. Varney, Baltimore, Md.
2	New York (Metropolitan Sec.)	George K. Parsons, New York City	H. G. Tyler, New York City
3	Washington, D. C., Virginia, Atlanta, Birmingham, New Orleans	Geo. A. Weschler, Washington, D. C.	S. W. Stratton, Washington, D. C.
4	Rochester, Buffalo, Toronto (Ont.), Cleveland, Erie	E. H. Whitlock, Cleveland, Ohio	C. M. Spalding, Erie, Pa.
5	Milwaukee, Chicago, Indianapolis, Cincinnati, Detroit	Geo. W. Galbraith, Cincinnati, Ohio	H. M. Norris, Cincinnati, Ohio
6	St. Paul, Minneapolis (Minnesota Sec.), St. Louis, Mid-Continent, Colorado, Houston	C. B. Lord, St. Louis	J. A. Hunter, Boulder, Colo.
7	Los Angeles, San Francisco, Oregon, Washington State	Robert Sibley, San Francisco, Cal.	E. O. Eastwood, Seattle, Wash.



DINNER OF ATLANTA SECTION ON OCCASION OF DEAN KIMBALL'S VISIT

Inter-Professional Conference

The Inter-Professional Conference announced in MECHANICAL ENGINEERING was held in Detroit November 28-29. Mr. Charles Whiting Baker, President of the Baker Economic Transport Corporation, was appointed by Engineering Council to be the official spokesman for the engineers and Mr. Calvin W. Rice was also present as a member of the Committee on Organization.

The proceedings of the two sessions consisted in talking over the probabilities and possibilities of an inter-professional organization and in laying out a plan of organization and a definite course of action for the future. See the Secretary's Letter for report.

THE NEW OFFICERS OF THE SOCIETY

ALL the members of the Society nominated by the Regular Nominating Committee for 1919 to fill the vacancies in the elective offices were elected at the Annual Meeting. The Committee was selected as heretofore by the President consulting the Local Sections and was made up as follows:

Nominating Committee	Sections
Robert Sibley	San Francisco Los Angeles
J. V. Martenis	Minnesota Milwaukee Chicago St. Louis Indianapolis
Theodore H. Hinchman	Cincinnati Cleveland Detroit Ontario Buffalo Erie
H. J. Hinchey	Birmingham Atlanta New Orleans
Alexander G. Christie	Boston Connecticut Worcester New York

This is the last time that the Committee will be so appointed. In fact elsewhere in this issue is an account of the manner of electing the Nominating Committee for 1920 by the voting membership and the personnel of the Committee which is already elected by the Society.

A brief synopsis of the achievements and attainments of the new officers will be of interest:

FRED J. MILLER
President

Fred J. Miller was born in Ohio in 1857. He had a common and high school education, supplemented by personal study and special instruction. He served an apprenticeship of four years in the machinist trade, and for a number of years worked in various capacities in machine shops.

He became a contributor to mechanical journals and finally a member of the editorial staff of a prominent machinery journal, where he remained for 20 years, the last 10 years of which he spent as editor-in-chief and vice-president of the publishing company. During this time he acquired an extensive acquaintance with machinery-building establishments in Europe, as well as in America.

After retiring from journalism, Mr. Miller was for nine years general manager of a group of typewriter factories, and was then commissioned Major of Ordnance in the U. S. Army, being stationed during most of his service at the Rock Island Arsenal, where he organized and was at the head of the Civilian Service Divison of the Arsenal. Afterward he was attached to the office of the Director of Arsenals in Washington, being assigned to duty at the Bethlehem Steel Works, and was then attached to the office of the Secretary of War. He is now a member of the Technical Advisory Committee of the War Claims Board at Washington.

Major Miller became a member of the Society in 1890, and has always taken an active interest in its affairs, having served on a number of important committees, and as a member of Council from 1904 to 1907, inclusive. He also served two terms as the Society's representative on the Board of the United Engineering Societies, where he was Chairman of three successive committees entrusted with the work of reorganizing and perfecting the Founder Societies' business affairs and finances. He was a member of the Council at the time *The Journal* of the Society was started, and has always been consulted on questions relating to its development, having recently devoted considerable time to the study of the Society's publishing problems and its office methods and organization.

JOHN ROBINS ALLEN
Vice-President

John Robins Allen was born in Milwaukee, Wis., in 1869. He was graduated from the University of Michigan in 1892 with the degree of B.S., and received his M.E. degree in 1896. For one year he was connected with the Bay City Industrial Works and for two years with the L. K. Comstock Construction Co.

From 1896 to 1911 Mr. Allen was associated with the mechanical-engineering department of the University of Michigan, rising from an instructorship to a full professorship. The next year he was called to Robert College in Constantinople, Turkey, as dean of the engineering department. After a year's service he returned to the University of Michigan as head of the mechancal-engineering department, being so connected until 1917 when he became Dean of the College of Engineering and Architecture of the University of Minnesota. Early in the present year, Mr. Allen became director of the Research Bureau of the American Society of Heating and Ventilating Engineers, with headquarters at the U. S. Bureau of Mines, Pittsburgh.

Besides being a member of our Society since 1894, Mr. Allen is a past-president of the American Society of Heating and Ventilating Engineers, past-president of the Michigan Engineering Society, and a member of the British Institution of Heating and Ventilating Engineers, of the Society for the Promotion of Engineering Education and an honorary member of the National District Heating Association. He also belongs to the honorary societies of Sigma Xi and Tau Beta Pi.

ROBERT H. FERNALD
Vice-President

Robert Haywood Fernald was born in Orono, Me., in 1871. He received the degree of B.M.E., Maine State College, in 1892, and spent the next year at Massachusetts Institute of Technology. He later received degrees of A.M. and Ph.D. from Columbia University and the degree of M.E. from Case School of Applied Science, Cleveland, Ohio, where he was instructor and assistant professor from 1893 to 1901, and professor of mechanical engineering from 1907 to 1912, after having held the same position at Washington University, St. Louis, Mo., from 1902 to 1907. Since 1912 he has been professor of dynamical engineering at the University of Pennsylvania, Philadelphia, Pa.

Professor Fernald has conducted investigations for the U. S. Geological Survey and the Bureau of Mines. He was engineer in charge of Technologic Branch, U. S. Geological Survey, from 1904 to 1910 and has been consulting engineer of the Fuel Division of the Bureau of Mines, since 1910.

In addition to preparing exhaustive reports for these two government departments, Professor Fernald, with Geo. A. Orrok, was author of "Engineering of Power Plants." He has also contributed a number of papers on engineering topics to technical journals.

Professor Fernald has been a member of the Society since 1903. He was chairman of the Gas Power Section in 1911; chairman of the Philadelphia Local Section, 1915-16; he has been a member of several committees, and was chairman of the Meetings and Programs Committee, 1917; he was a manager of the Society from 1916-19; he is a member of the Society for the Promotion of Engineering Education; Engineers' Club of Philadelphia, University Club of Philadelphia, and several other clubs. He was president of the Cleveland Engineering Society in 1912.

EDWARD C. JONES
Vice-President

Edward C. Jones was born in South Boston, Mass., in 1861, and was educated in the Boston public schools. He entered the gas business in 1876 at the South Boston Gas Works. In 1889 he became superintendent of the Boston Gas Light Co., in charge of the North End Station and in 1890 was appointed assistant engineer in charge of manufacture.

In 1891 the San Francisco Gas Light Co. employed Mr. Jones as assistant engineer to construct the North Beach Gas Works, and when the Edison Light & Power Co. merged with the San Francisco Co., Mr. Jones became engineer of both the gas and electric departments. In 1902 he accepted the position of chief engineer of the California Central Gas & Electric Co., and upon the absorption of that company by the California Gas & Electric Corporation, he became chief engineer of all its plants. In 1906, he again returned to the San Francisco Gas & Electric Co. as chief engineer at the time of the purchase of that concern by the Pacific Gas & Electric Co., of which he is now chief engineer.

Mr. Jones has invented many valuable improvements in gas manufacture and distribution, particularly in the field of purification and in the development of the oil-gas process.

Mr. Jones is a member of the American Gas Light Association, a past-president of the Pacific Coast Gas Association, past-president of the American Gas Institute, and an honorary member of the New England Association of Gas Engineers. He has recently been appointed advisory engineer to the Bureau of Standards and is actively engaged in research work for the betterment of the gas industry.

He was chairman of the San Francisco Section of the A.S.M.E. for the year 1918-1919. He became a member of this Society in 1901.

ELBERT C. FISHER
Manager

Elbert C. Fisher was born in Scranton, Pa., in 1865. He prepared for college in the School of Lackawanna in Scranton, and graduated from Cornell University with the degree of M.E., in 1890.

He worked one year in the locomotive-repair shop of the Delaware-Lackawanna & Western Railroad, in Scranton, Pa.; one year for the

Westinghouse, Church, Kerr & Co., in Chicago, Ill., and four years for the Murphy Iron Works, as manager of the Chicago Office. He became associated with Wickes Brothers in 1895, and was made vice-president and general manager of The Wickes Boiler Co., in 1908, a position which he still holds.

Mr. Fisher joined the Society as a junior member in 1891, and was made a full member in 1913. In 1914 he was appointed on the A.S.M.E. Boiler Code Committee. He was chairman of the Detroit Local Section 1918-19.

He is a member of the American Boiler Manufacturers' Association and is on its executive committee, and is also a member of the Board of Boiler Rules of the state of Michigan.

DEXTER S. KIMBALL
Manager

Dexter S. Kimball was born in New River, New Brunswick, Canada, in 1865. He was graduated from Leland Stanford, Jr., University in 1896 with the degree of A.B., and received his M.E. degree in 1913.

He served his apprenticeship with Pope & Talbot, Port Gamble, Wash., and in the shops of the Union Iron Works, San Francisco. In 1898 he became designing engineer for the Anaconda Mining Co. For three years he served as assistant professor of machine design at Sibley College, Cornell University, when he became works manager of the Stanley Electric Manufacturing Co., Pittsfield, Mass. In 1904 he returned to Cornell University as professor of machine design and construction, and since 1915 has occupied the chair of industrial engineering.

In 1911 Professor Kimball was a member of the Council on Industrial Education, New York State Department of Education. He is also a member of the Society for the Promotion of Engineering Education and of the honorary societies Sigma Xi and Tau Beta Pi.

He is co-author with John H. Barr of Elements of Machine Design and author of Industrial Education, Principles of Industrial Organization and Elements of Cost Finding.

Professor Kimball became a member of the Society in 1900. He is now the chairman of the Committee on Meetings and Program of the Society, having charge of the professional features of the Annual and Spring Meetings. He is also a member of the Committee on Aims and Organization and chairman of the sub-committee on Relation of the Engineer to his Work.

EARL F. SCOTT
Manager

Earl F. Scott was born in Marshall, Tex., in 1874. He was graduated from Vanderbilt University in 1903 with the degree of B.S., and three years later received his degree of M.E. During the latter part of this period he served as an instructor in mechanical engineering. For several years thereafter he was occupied in drafting and mechanical designing.

From 1905 to 1908 Mr. Scott was associated with A. M. Lockett & Co., New Orleans, La., contracting mechanical engineers. During these years he had charge of the engineering department, designing and supervising the construction of a number of large irrigation plants. He also designed and completely installed several large power and steam-heating plants.

The next five years Mr. Scott spent with the General Fire Extinguisher Co., in charge of the engineering department of the Atlanta plant. Here his work dealt with fire-protection apparatus, automatic-sprinkler equipment, high-pressure steam-pipe work for power plants, etc. For one year he served as assistant manager of the Atlanta office of the Griscom-Russell Co.

Since 1914 Mr. Scott has been president and manager of Earl F. Scott & Co., Inc., and has designed and supervised the installing of condensers, spray equipment and power plants for many of the largest cotton mills in the country. The equipment of the heating plant at the Base Hospital at Camp Jackson, Columbia, S. C., is his work and consists of twelve 7500-sq. ft. rad. low-pressure boilers, including building foundation, stack and breeching, etc.

Mr. Scott was elected a junior member of the Society in 1904 and was promoted to full membership in 1906. From 1914 to 1916 he was chairman of the Atlanta Local Section. He is a member of the Committee on Aims and Organization.

WILLIAM H. WILEY
Treasurer

William H. Wiley was born in New York City in 1842, and received his A.B. degree from the College of the City of New York in 1861, and the degree of C.E. from Rensselaer Polytechnic Institute in 1866. He also studied as a special student at the Columbia School of Mines in 1868.

At the outbreak of the Civil War he joined the Seventh Regiment of New York Volunteers, and in 1862 was made first lieutenant, U. S. Volunteers. When the regiment was mustered out in 1864 he was given the title of Major, U.S.V., for service in the field.

Since 1878 Major Wiley has been a publisher of scientific works. He served as a member of the 58th, 59th and 61st Congresses from New Jersey. In 1897 he was president of an International Jury of the Brussels Exposition, and was a member of the Superior Jury, Brussels. He received the decoration of the Order of Leopold. He was a commissioner from New Jersey to the St. Louis Exposition in 1904.

Major Wiley is the author of a book on Yosemite, Alaska, and Yellowstone, published in 1888, and acted as New York correspondent for London *Engineering* for 20 years. He is a member of the American Society of Civil Engineers, the American Institute of Electrical Engineers, the American Institute of Mining Engineers, the American Association for the Advancement of Science, the National Geographic Society, the Order of Leopold, Belgium and the Loyal Legion.

Major Wiley has been a member of the Society since its organization. He was appointed on the Finance Committee in 1882. While serving as chairman of this committee he was elected Treasurer of the Society in 1884, and has been regularly nominated and elected for the period of thirty-five years which have since elapsed.

PERSONALS

In these columns are inserted items concerning members of the Society and their professional activities. Members are always interested in the doings of their fellow-members, and the Society welcomes notes from members and concerning members for insertion in this section. All communications of personal notes should be addressed to the Secretary, and items should be received by January 15 in order to appear in the February issue.

CHANGES OF POSITION

William Tietze has resigned from his position as chief engineer of the Cudahy Brothers Company, of Cudahy, Wis., to assume the position of manager of the Citizens Light, Heat and Power Company, of Canby, Minn.

R. W. Hargrave, formerly production engineer, The Regina Company, Rahway, N. J., has become associated with the DeLaval Separator Company, Poughkeepsie, N. Y., in charge of tool production.

Herbert R. Connor, until recently connected with the Meese and Gottfried Company, San Francisco, Cal., as mechanical engineer, has entered the employ of The Phillips Rice Milling Company, of the same city.

George S. Brady, formerly process and equipment engineer, Winchester Repeating Arms Company, New Haven, Conn., is now with the Department of Commerce as United States Trade Commissioner to Argentine.

Ralph C. Chesnutt has become affiliated with the engineering department of the Bethlehem Motors Corporation, Allentown, Pa. He was formerly assistant chief engineer, North American Motors Company, Pottstown, Pa.

Frederick J. Brengel, formerly connected with the Bailey Meter Company, Cleveland, Ohio, in the capacity of works manager, has assumed the position of manager of the Boston Tool and Manufacturing Company, of Boston, Mass.

James T. Enes has become associated with the Otis Steel Company, Riverside plant, Cleveland, Ohio. He was, until recently, designer with Perin and Marshall, New York.

R. C. Holman, formerly with the General Electric Company, centrifugal department, is now associated with the Hooven, Owens, Rentschler Company, in charge of all blowing engines.

Walter E. Farnham, formerly instructor in general engineering drawing, University of Illinois, Urbana, Ill., has assumed the position of assistant professor of technical drawing, Tufts College.

James L. Haynes has become affiliated with the Federal Shipbuilding Company, Newark, N. J. He was until recently connected with the Groton Iron Works, Groton, Conn.

E. S. Cooley, formerly with the Fall River Shipbuilding Company, is now connected with the New York office of the Hooven, Owens, Rentschler Company.

Richard Fitz-Gerald, formerly production engineer with The National Conduit and Cable Company, Hastings-on-Hudson, N. Y., has become associated with Lybrand Ross Brothers and Montgomery, New York.

George E. Harris has resigned his position as director of sales, Hawkridge Brothers Company, Boston, Mass., to become associated with The Falcon Steel Company, Niles, Ohio, in the capacity of general manager of sales.

Joseph G. Worker has assumed the duties of general manager of the Phœnix Manufacturing Company, Eau Claire, Wis., having general supervision of sales, engineering and production. He was formerly connected with the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., as manager of the stoker division.

GEORGE B. MALONE has resigned his position as works manager for the Monel Metal Products Corporation to accept the position of general manager of the K-G Welding and Cutting Company, New York.

EMANUEL R. POSNACK has become associated with A. Hermansen, industrial furnace engineers, New York. He was formerly engineer-draftsman with Adams, Lovell, Burlinghom, Inc., New York.

ALFRED C. BROWN, until recently general manager of the Marlin Rockwell Corporation, Tacony, Philadelphia division, is now associated with the Liberty Motor Car Company, of Detroit, Mich.

G. G. SPENCER, formerly associated with the Toronto Power Company, Ltd., Toronto, Ont., Canada, has become affiliated with the American Sugar Refining Company, of New York.

ANNOUNCEMENTS

ALFRED V. BODINE has become connected with the Columbia Graphophone Manufacturing Company, Bridgeport, Conn., in the capacity of mechanical engineer.

J. L. STONE has accepted a position in the chassis parts department of the Muncie Products Company, Muncie, Ind.

CAPTAIN HOWARD D. MACDONALD, 33d Division, A.E.F., has returned from France and has been honorably discharged from the Army after 2½ years of service. He has rejoined the engineering staff of the International Harvester Company on the development of gas-power engineering, with headquarters in Chicago, Ill.

JOHN CENTRULE has become affiliated with the firm of J. H. Wilhelm, Inc., consulting engineers of New York, as chief inspection engineer.

The firm of Frank P. Peterson and Company was transferred to DEAN E. FOSTER and FORREST E. GILMORE, two of Mr. Peterson's associates, who continued under the old name until recently, when it was changed to Foster and Gilmore, consulting engineers. Mr. Foster, the senior member of the new firm, was formerly professor of mechanical engineering, State College of Washington, Pullman, Wash., and later became connected with Cosden and Company, as research engineer and technical advisor, which position he resigned to enter partnership with Mr. Peterson. Mr. Gilmore was a member of the engineering force that designed and built the Cosden Refinery at West Tulsa, Okla. Later he became associated with Frank P. Peterson and Company, and during the war served in the Air Service Division of Military Aeronautics.

CHARLES C. LYNDE, Captain Corps of Engineers, was honorably discharged from the U. S. Army on October 4, 1919, after 21 months' service overseas, and has taken up duties as engineering editor for the Trade Press Publishing Company, with offices in Cleveland, Ohio.

APPOINTMENTS

THOMAS E. STUART has been appointed mechanical engineer for the U. S. Food Products Corporation, with headquarters at Peoria, Ill.

GEORGE P. SONN has been appointed chief engineer for the National Conduit and Cable Company, and National Brass and Copper Tube Company.

NECROLOGY

STEPHEN P. BROWN

Stephen P. Brown, who, until June 1919, was vice-president and general manager of Ford, Bacon & Davis, Engineers, New York, met his death on Saturday, December 6, 1919, by drowning at Sebec Lake, Dover, Me., when he broke through the ice on which he and his nine-year old son were crossing to a landing. His delay in seeing his son to safety cost him his own life.

Mr. Brown was born in Dover, Me., on April 29, 1877. He was educated in the town schools, Foxcroft Academy, Hotchkiss School and the Massachusetts Institute of Technology from which he was graduated in 1900. In that year he began his career as junior partner in the firm of Collier & Brown, consulting engineers, Atlanta, Ga. He remained with the firm until 1904 when he was made inspector of the Bridgeport Station Works of the N. Y., N. H. & H. R. R. From 1905 to 1909 he was with the United Engineering & Contracting Co. holding in succession positions of increasing importance, finally as general superintendent of all work west of Fifth Avenue on the Pennsylvania Railroad cross-town tunnels under New York. For the next three years he was chief engineer of the Tidewater Building Co., building a section of the Fourth Avenue Rapid Transit four-track subway in Brooklyn, N. Y.

From 1912 to 1917 Mr. Brown was chief engineer of the Mount Royal Tunnel & Terminal Co., Ltd., and managing engineer for Mackenzie, Mann & Co., Ltd., having charge of both design and construction of the terminal development in Montreal for the Canadian Northern Railway. From 1918 to June 1919, Mr. Brown was vice-president and general manager of Ford, Bacon & Davis, Engineers, New York City. He left in June to take a long vacation in the Maine woods, where he met his tragic end.

Mr. Brown was a member of the American Society of Civil Engineers, the American Railway Engineering Association, the Engineering Institution of Canada, the Institution of Civil Engineers (British), and of the Engineers' and the University Club of New York. He became a member of the Society in 1909.

CLIFFORD LEE

Clifford Lee was born in Forrest Grove, Oregon, on October 23, 1886. He was educated in the common schools of Washington and of Oregon and in 1911 was graduated from Purdue University as a mechanical engineer. Upon graduation he became connected with the Willamette Iron and Steel Co. Works, Portland, Ore., where he served a "technical apprenticeship" course in the boiler and structural shop, later being advanced to the engineering force where his work dealt with design and estimating. His next position was with the United States Rubber Corporation, first as development engineer on the installation and erection of vulcanizing apparatus and then as mechanical engineer in charge of construction and maintenance at the India Rubber Co., New Brunswick, N. J., the hard-rubber plant for the corporation. In August, 1918, Mr. Lee resigned from this position to become mechanical engineer at the Government explosive plant in Nitro, West. Va. At the close of the War he returned again to take up his position at the India Rubber Co. but was compelled very shortly to give up his work on account of ill health. He died in Portland, Ore., on May 24, 1919.

Mr. Lee became a member of the Society in 1916.

CHARLES EKSTRAND

Charles Ekstrand, constructing and consulting engineer with the Warner Sugar Refining and the Warner Quinlan Asphalt companies, New York, died on September 28, 1919. Mr. Ekstrand was born on August 19, 1863, in Kalmar, Sweden, and received his early education in Swedish schools. He served an apprenticeship as marine engineer and later obtained his license as chief engineer on ocean-going steamers. He was formerly connected with the Brooklyn Cooperage Co. and Palmer Docks, Brooklyn, as chief engineer and with the Lowell M. Palmer Plants, York, Pa., as superintendent.

During the War Mr. Ekstrand served as lieutenant in the U. S. N. R. F. He was an associate member of the American Institute of Electrical Engineers. He became a member of our Society in 1898.

GEORGE SCHUHMANN

George Schuhmann, vice-president and general manager of the Reading Iron Co., Reading Pa., died on November 12, 1919. Mr. Schuhmann was born on October 18, 1855, in Weinheim, Baden, Germany and was educated in the industrial and high schools of that city.

Mr. Schuhmann came to this country in 1874 and was associated for varying periods with the Philadelphia Hydraulic Works, the Gregg Brick Machine Co., and the Reading Iron Works. From 1891 to 1919 he held successively the positions of assistant, department and general superintendent, general manager and vice-president of the Reading Iron Co.

He was a recognized authority on wrought iron and the manufacture of welded pipe and was the author of a number of technical treatises on these subjects. He was a member of the American Society for Testing Materials. He became a member of our Society in 1884.

FRANCIS L. HAND

Francis L. Hand was born at Dennisville, Cape May County, N. J., on February 18, 1838. He was educated in the public schools of Philadelphia. In 1854 he began his "steamboating" career on the *Delaware* and four years later obtained his first engineer's license. Later he was employed as assistant engineer on the *Kennebec* and during the Civil War he was on the steamer *Union*, taking part in the Dupont-Sherman Expedition. In 1865 Mr. Hand became chief engineer of the *Star of the Union* and afterwards held the positions of chief engineer in the Southern Mail Steamship Co. of Philadelphia and U. S. inspector of steam vessels. In 1886 he became general superintendent of the Philadelphia Water Department, holding that position until 1900 when he was appointed chief engineer of the Water Bureau.

In 1906 Mr. Hand retired from active life. He died on September 11, 1919 in his eighty-second year. He was a member of the Engineers' Club of Philadelphia and of the American Water Works Association. He became a member of the Society in 1888.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society records.

INSTRUCTORS: All engineers willing to consider teaching positions are invited to register with Engineering Societies Employment Bureau. The Bureau has been called upon to fill more positions, varying in grade from laboratory assistant to heads of department in various engineering and technical schools of this country, than it has been able to do from among the men now registered. Blanks for purpose of registration and information regarding the Bureau may be had by addressing W. V. Brown, Manager, 29 West 39th Street.

AUTOMATIC MACHINE DESIGNER: familiarity with machinery for plant manufacturing wood and machine screws, machine-screw nuts, rivets and burrs, cap and set screws, etc. Location Massachusetts. R-2101.

ASSISTANT INDUSTRIAL ENGINEER with machine shop training to do routing of shop orders and some drafting; must be young man. Location Massachusetts. R-2102.

RECENT GRADUATE or man with one to three years' experience, for general testing work in laboratory of large manufacturing company. Salary $100 up, depending upon experience. Several openings. Location Pennsylvania. R-2103.

INSTRUCTOR IN MECHANICAL ENGINEERING: previous teaching experience desirable. Duties will include recitation and laboratory work in steam, gas engines and steam boilers and assisting in more advanced course. State age, education, and experience, also enclose recent photograph if possible. Location Michigan. Salary $2,000 per year to start. R-2105.

DESIGING DRAFTSMAN, must be experienced in steel plant and rolling mill work. Location Ohio. Salary $225 per month. R-2107.

PRODUCTION MANAGER: young technical graduate, preferably married, ambitious and not afraid to work for advancement, to take charge of production department for manufacture of machine-tool and automobile parts. Location Middle West. R-2111.

MECHANICAL DRAFTSMAN, experienced in and familiar with location and installation of machinery. Location New Jersey. Salary $1,800-$2,400, depending on ability. R-2112.

INSTRUCTOR AND WRITER; capable of handling correspondence course. Openings in all branches of engineering, as civil, mechanical, electrical, mining, chemical, architecture, etc. Whole or part time work. Location New York City. R-2114.

OFFICE MANAGER, must have thorough knowledge of heavy hardware and machinery, such as agricultural implements; steel and iron structural goods, like bars, sheets, pipe, angles, channels, rails; valves, knuckles, joints, etc.; pumps, pulleys, hoists, etc. Should have smattering of Spanish but knowledge of above lines is preferable; should be hustler of good character, good mixer and not afraid to work. Salary is fair to start with. Will have charge of office in his department and when he shows his worth, will receive raise and percentage on business. Location Cuba. R-2117.

RECENT CIVIL ENGINEERING GRADUATE of recognized college; duties will be to learn to be an estimator. Location Washington, D. C. Salary about $1,200 per year. R-2120.

TOOL DESIGNERS experienced in designing medium and light tools, as gages and fixtures; for general contract work. Openings for five men. Location Newark, N. J. Salary $40. R-2122.

YOUNG MECHANICAL ENGINEERS, recent grauates, with two or three years' experience. Positions are with large industrial corporation. Location New Jersey. R-2126.

ARCHITECTURAL DRAFTSMAN familiar with industrial building work, to make preliminary drawings layout of machinery, estimates, working drawings of buildings, etc. Location Waterbury, Conn. Salary $50. R-2133.

REINFORCED-CONCRETE DESIGNERS, experienced in reinforced-concrete building construction. Several openings. Location Pennsylvania. R-2135.

DRAFTSMAN for large gas-furnace work; two or three years' industrial experience required. Location Ctntral New York. R-2137.

DRAFTSMAN AND DESIGNER, experienced on printing-press work. Position will lead to that of chief draftsman in near future. Location Syracuse, New York. Salary $40-60. R-2139.

STRUCTURAL ENGINEER; must have experience both in design and construction of steel structures. Advertiser is seeking an associate. Location Omaha, Nebraska. R-2140.

ESTIMATOR AND DESIGNER experienced in structural-steel work for buildings and bridges. Salary $150-200. Location Beaver Falls, Pa. R-2145.

DETAIL DRAFTSMAN, must have structural-steel experience. Location Beaver Falls, Pa. R-2146.

EFFICIENCY ENGINEER, experienced in time study and rate setting. Location Cleveland, Ohio. R-2150.

DESIGNERS AND DETAILERS, experienced in general elevating and conveying machinery; also must be familiar with construction of coal tipples and coal-handling equipment for by-product coke-oven installation. R-2156.

DESIGNER AND DETAILER FOR ELECTRIC-TRAVELING CRANES, with several years' experience and familiar with both mechanical and structural features. Opportunity for capable man to develop rapidly to chief draftsman. Location Pennsylvania. R-2161A.

CHECKER FOR STRUCTURAL STEEL, with several years' experience and familiar with both mechanical and structural features. Location Pennsylvania. R-2161B.

ASSISTANT PROFESSOR IN MACHINE DESIGN; must be technical graduate with both field and teaching experience. Location Wisconsin. Salary, 10 months, to begin $2,400. R-2162.

MECHANICAL ENGINEER, must be technical-school graduate with manufacturing experience. Excellent opening for first-class man with industrial establishment. Location Chicago, Ill. R-2164.

MECHANICAL ENGINEER ON INDUSTRIAL WORK; young man for foundry-plant construction and maintenance of buildings and equipment. Prefer technically-educated man with two or three years' experience along this line. Location Wilmington, Del. R-2165.

TOOL-ROOM FOREMAN; experience on gasoline-engine production tools preferred. Location Western Michigan. R-2166.

TOOL DESIGNER; experience on gasoline-engine production tools preferred. Location Western Michigan. R-2167.

ASSOCIATE IN EXPORT WORK; must be either electrical or mechanical engineering graduate, with considerable experience in power-plant and electrical lines. Would be given an opportunity to take a $20,000 interest in corporation and would be given charge of one of the offices in China. R-2171.

RESEARCH ENGINEER of keenly analytical type, resourceful, painstaking, thorough and possessing good judgment. Should have several years' experience in working out manufacturing problems; more particularly those having to do with standardization of materials and processes. Need not be graduate engineer, although good working knowledge of machinery is essential. Location Rochester, New York. Salary $2500-$3500 per year, depending on man. R-2173.

CHIEF DRAFTSMAN, technical education, and three or four years' shop or drafting-room experience on engine and boiler work. Location Cincinnati, Ohio. R-2174.

LOCOMOTIVE DESIGNER AND DETAILER; thoroughly experienced in this line of work. Location Pittsburgh, Pa. R-2176.

INSTRUCTOR IN MACHINE SHOP; need not have college training, although educational qualifications will be of importance. Location West Virginia. Salary $1500-$1700, depending on man. R-2177.

INSTRUCTOR IN MOLDING AND FOUNDRY WORK; college training not required, but educational qualifications of importance. Opening February, 1920. Location West Virginia. Salary $1500-$1700, depending on man. R-2178.

MECHANICAL DRAFTSMAN with automobile experience for position with company building caterpillar tractors. Location Hoboken, N. J. Good salary. R-2180.

INSTRUCTOR IN ENGINEERING MECHANICS, must have technical education. Department is being reorganized; good opportunity for right man. Must report by February 1, 1920. Location Connecticut. Salary $1500-$1800 per year. R-2181.

RESIDENT ENGINEER, extensive experience on highway location and construction. Should have speaking knowledge of Spanish. Single man preferred. Openings for four men. Location Santo Domingo. Salary $250 per month. R-2182.

ASSISTANT ENGINEER, should be able to rerun alignment for highway construction, cross-section, plot and figure cross-sections, lay out culverts and perform all work that assistant engineer is usually required to do in this class of work. Single man preferred. Speaking knowledge of Spanish desired, but not necessary. Five openings. Location Santo Domingo. Salary $175 per month. R-2183.

BUILDING SUPERINTENDENT, experience with wood and concrete structures. Must be able to speak Spanish. Location Santo Domingo. Salary $225 per month. R-2184.

TRACTOR DESIGNERS; must be technical men; three openings. Location Massachusetts. R-2185.

DRAFTSMAN with experience in mechanical layout and mechanical construction work. Two openings. Applications from men who are desirous of locating in vicinity of Buffalo, N. Y., wanted. Location Buffalo, New York. R-2187.

ENGINEERING ACCOUNTANT capable of handling complete report work and distribution of labor and materials reports. Should have some practical knowledge of railroad work, both in field and office, and good understanding of interstate commerce construction accounts. Two openings. Location Middle West. Salary $175. R-2188.

INSTRUCTOR IN REINFORCED CONCRETE: about ten years' experience in reinforced-concrete work of all kinds. Location Middle West. R-2190.

CONSULTING ENGINEER with experience on flour mills and corn products for work in South Africa, which might involve a trip to South Africa to supervise installation. The work consists of selecting and specifying complete machinery equipment along the most modern lines for a new plant, as well as the design and lay-out of the plant itself. Location South Africa. R-2192.

ENGINEER familiar with handling of pulverized fuel. Location New York City. R-2195.

DRAFTSMEN; four or five years' experience in general engineering work. Technical graduates desired. Several openings. Two architectural draftsmen, two structural draftsmen, three mechanical draftsmen. Location Cleveland, Ohio. Salary $175 per month up. R-2201.

SALES ENGINEER mechanically inclined, recent M. E. graduate; experience in salesmanship preferred. Several openings. Location New York City. Salary, drawing account and commission. R-2204.

ASSISTANT MECHANICAL ENGINEER; ability to handle repair and upkeep work and shop instructions; capable of supervising plant, repairs, renewals and of creating and executing new designs and equipment. Prefer recent graduate, willing to work his way up in organizations. Location Tuckahoe, N. Y. Salary $115 per month. R-2206.

ENGINEER EXECUTIVE to take charge of design, construction and installation of all machinery for four wireless stations of not more than 240 miles range. Location vicinity of New York. R-2207.

MECHANICAL DRAFTSMEN; men who are capable of taking job, putting it into shop and are certain that it is right; men who need very little checking or supervision. Employment would be chiefly on Corliss-engine work with opportunity to work on other products if proficient. This company builds a variety of heavy machinery, but its chief products are all kinds of steam engines and sugar mills. Location Hamilton, Ohio. R-2209.

ASSISTANT PROFESSOR OF ELECTRICAL ENGINEERING; several years of teaching experience. Duties will consist of class-room and laboratory work, chiefly in electrical engineering, and including some work in physics. Location Baltimore District. Salary $2400 a year. R-2210.

INSTRUCTOR IN STEAM- AND GAS-ENGINEERING LABORATORY; previous teaching experience desirable but not absolutely necessary. Duties to begin February 16, 1920. Location Middle West. Salary $1500 (about). R-2212.

STOREROOM EXECUTIVE capable of planning, directing and supervising all activities pertaining to automobile-stores management in operating organization and also in automobile factory. Location Chicago, Ill. R-2213.

REFRIGERATING ENGINEER with both theoretical and practical experience in ice-making and refrigerating machinery. Must be qualified to handle inquiries, estimate all engineering requirements pertaining thereto, prepare complete specifications and contract forms ready for purchaser with guarantees attached. Several openings in estimating and sales-engineering departments. Location Wisconsin. R-2217.

RECENT GRADUATES; several openings for experimental, designing and drafting work along lines of kerosene, heavy-fuel and semi-diesel engines, reciprocating and centrifugal pumps. Location Wisconsin. R-2220.

ESTIMATOR AND DRAFTSMAN for position with company manufacturing boilers. Good future. Location New York City. Salary $35-$40 per week. R-2223.

YOUNG GRADUATE ENGINEER with experience in combustion engineering and heavy and diesel-oil engines. Three openings. Successful candidates will receive a six-months course of training in preparation for foreign assignment. Salary $2000-$2400. R-2228.

TOOL DESIGNER with experience on small tools. Location Brooklyn, N. Y. Salary $40-$50 per week. R-2232.

POWER SALESMAN; graduate electrical engineer with at least four years' experience in general electrical work. Permanent position. Good future. Location Easton, Pa. Salary $175-$200 per month. R-2233.

MACHINE-TOOL ENGINEER with experience in sales methods and office organization; must have executive ability. Position is in Toronto, Canada, with the U. S. Govt. for temporary period of not less than four months and not more than eight months. Salary $3000 per annum. R-2234.

TECHNICAL TRANSLATOR, must understand either French, Spanish or Portugese. Position is in editorial department of large publishing house. Several openings. Location New York City. R-2235.

MECHANICAL DRAFTSMAN; experience in mill designing for mining operations. Several openings. Location Fresnillo, Mexico. R-2238.

ELECTRICAL DRAFTSMAN for work on electrical design of generating and sub-stations. Experience in this work desirable but not absolutely essential. Several openings. Location Chicago, Ill. Salary $110-$140 per month. R-2239.

PRODUCTION ENGINEER; technical man, preferable about 30, for job-analysis and general production work in brass mill. Location Bridgeport, Conn. R-2241.

FOREMAN FOR WHITE-METAL PLANT; will be required to do own alloying and look after plant in general. Location Cleveland, Ohio. R-2242.

MECHANICAL DRAFTSMAN with valve and pipe-fitting experience, should be thoroughly experienced in design of automatic and semi-automatic machinery, and capable of designing jigs, tools and fixtures for small work. Position is under personal supervision of plant superintendent, and shop hours are necessarily kept. Some general engineering experience desirable. Location, Pennsylvania. R-2246.

CHIEF DRAFTSMAN with thorough and varied experience in design and application of conveyors, more especially the pivoted-bucket type. Applicant must be capable and qualified to enable him to take over company's conveyor department as far as engineering end is concerned; must be qualified to take present design with view to effecting economy in production, and be thoroughly conversant with application of this type of conveying equipment to requirements of power stations, industrial companies, etc. Location East Boston, Mass. R-2247.

INSTRUCTOR IN CIVIL ENGINEERING, must be technical graduate especially interested in hydraulic-laboratory work, as well as hydraulics, and in sanitary engineering. Location Maryland. R-2252.

TOOL DRAFTSMAN thoroughly experienced and A-1 in every respect. Location Flushing, L. I., N. Y. Salary depends upon man. R-2254.

DRAFTSMAN with experience on press tools, forming dies and automatic-press speeds, or on screw-machine tools, automatic-screw machines and special automatic machines. Two openings. Location Flushing, L. I., N. Y. Salary depends upon man. R-2256.

MECHANICAL DRAFTSMAN familiar with shipyard work. Location Hoboken, N. J. R-2257.

SAFETY ENGINEER; must be tactful, diplomatic and have ability to confer with executives and government officials. Mechanical engineering graduate with three or more years' experience in manufacturing plant. Government position. Salary up to $2700 per year. Location Washington, D. C. R-2314.

ENGINEER with broad experience in various industries for editing technical publications. Location South New England. R-2315.

ENGINEERING DRAFTSMAN on concrete and steel, with about five years' experience; must have designing ability. Location New York City. R-2318.

MECHANICAL ENGINEER 28 to 35 years of age for plant design and layout in oil refinery. Duty includes study of requirements and devising improvements. Must possess energy and ability to analyze and solve problems without constant supervision. Salary $200 to $250 per month. Location Virginia. R-2319.

TOOL DESIGNERS for jig and fixture work. Location New Brunswick, New Jersey. R-2320.

TOOL DESIGNERS with six to eight years' experience. Ten openings with automobile manufacturing company. Salary $200 per month. Location Michigan. R-2321.

OFFICE MANAGER for manufacturing company making pneumatic tools, air hammers, drill grinders, pneumatic drills and grinders, compressors and oil engines. Must be graduate engineer. Man under 30 preferred. R-2322.

DESIGNER AND ESTIMATOR for heating and ventilating work. Salary $35-$40 per week. Location New York City. R-2323.

MECHANICAL DRAFTSMAN wanted by well-established company, manufacturing complete line of d.c. and a.c. generators and motors. Good opportunity for experienced man capable of working into position of assistant chief draftsman. Location Western Pennsylvania. R-2332.

BUNKER MARKETING MAN familiar with North and South Atlantic traffic. Practical knowledge of freight and operation desirable. Man familiar not only with shipping operations into which ports of the United States enter, but also those into which only the foreign ports enter, preferred. Location New York City. R-2333.

MACHINE DESIGNER able to develop machines under instruction; experience in printing presses desirable but not necessary. Salary $40 per week. Location Connecticut. R-2334.

DEVELOPMENT ENGINEER, whose experience has been on design of complicated automatic machinery. Yankee preferred. Prolific imagination and practical productivity more important than college education. Describe in detail exact character of work done and give list of patents if any. Salary $3000 to start, future dependent on achievement. Tool designers, plant-efficiency or production engineers not wanted for this position. R-2338.

DRAFTSMAN competent to assist in design of copper-smelting and concentrating equipment. Location New York City. R-2339.

DETAIL DRAFTSMAN with experience on machine tools and automatic machine work. Several openings in positions offering advancement to right man. Location Bridgeport, Conn. R-2341.

ASSISTANT CRANE ENGINEER who has had experience with crane manufacturers. Location Erie, Pa. R-2344.

STRUCTURAL DETAILER able to check steel details in factory and office buildings. Location Erie, Pa. R-2345.

SALES ENGINEER to handle line of boilers, engines, power-plant machinery and electric traveling cranes and hoists in New York City territory. R-2346.

SALES ENGINEERS; mechanical or chemical engineering graduates with some sales experience if possible; with military service during the past war, and willingness to start at moderate salary; good prospects for advancement. Initial salary will be about $1800 per year. Headquarters Ohio. R-2347.

DESIGNER; mechanical engineer with experience in steam power station work. Man about 30 years old desired. Salary $250 per month. Location New York City. R-2353.

STRUCTURAL AND MECHANICAL DRAFTSMAN; must be able to make good drawings of layouts for conveying and elevating machinery and of structural work. Location Jersey City, N. J. R-2354.

HIGH-GRADE ENGINEERING SALESMAN to devote time to sales of concrete machinery in district of Manhattan. R-2357A.

RECENT GRADUATES in mechanical and electrical engineering for education in sales work. One opening for each type of man. Location New York City. R-2357B.

DESIGNERS AND DRAFTSMEN experienced in general plant layout work for position with U. S. Government. Location Washington, D. C. R-2358.

ELECTRICAL DRAFTSMAN, must have experience on power house, sub-station and plant layout work. Salary depends on man. Location Connecticut. R-2359.

DESIGNING ENGINEER AND DRAFTSMEN for development work on automatic and special machinery. Location Newark, New Jersey. Seven men wanted. R-2361.

RESEARCH ENGINEER, to be assistant to chief engineer and to take charge of research laboratory. Ideal man would be one who has done some work as assistant professor in college and has followed this up with some practical commercial experience where he would get opportunity to act as executive in handling men. Work requires knowledge and experience in thermodynamics. Salary $300 per month to a man who can fill above requirements; every possibility for a promising future. Application must be made through commercial employment agency. R-2364.

TOOL DESIGNER experienced on tools and fixtures for pressed-metal work, as well as for machining operations, to design and detail tools for manufacturing automobile radiators. Present salary in proportion to ability. Excellent opportunity for advancement. Location New York State. R-2365.

AUTOMOBILE-RADIATOR DESIGNER experienced on pressed-metal work, as well as other mechanical designs, to design and draw automobile radiators and their component parts. Present salary in proportion to ability. Excellent opportunity for advancement. Location New York State. R-2366.

DESIGNER to supervise designing of special automatic machines, jigs, fixtures and regular routine engineering and drafting work for a manufacturing plant. Will have charge of all the drafting work, records, etc. Location Massachusetts. R-2367.

INSTRUCTOR IN MECHANICAL LABORATORY; young college graduate in mechanical engineering, with one or two years' of commercial experience, preferably in experimental work. Man about twenty-five years of age really desirous to get into teaching game desired. If he has the right kind of personality and push there is excellent opportunity for advancement to a very responsible position. Salary $2000 per year of ten months. Location Brooklyn, New York. R-2368

MECHANICAL DRAFTSMAN of good ability; must be able to go ahead and complete design work upon preliminary information of company's expert. Work at first will consist of designing of equipment for manufacture of tires. Salary about $150 a month to start. Location New Jersey. R-2369.

DRAFTSMAN with experience in jig, fixture, punch and die design. Man familiar with casting, core work and machine-shop practice desired. Location, Newark, New Jersey. Salary depends upon man. R-2371.

MARINE ENGINEERS; one opening for man experienced on Diesel-engine design and layout work; two openings for men experienced in general marine machinery and layouts. Permanent positions with company building large Diesel ships. Location Newark, N. J. R-2373.

WORKS MANAGER for position with company manufacturing grinding machinery. Machine-tool experience desired. Location Massachusetts. R-2374.

MECHANICAL ENGINEER for position with large chemical company in Philadelphia; experience in design of chemical apparatus desirable. R-2377.

INSTRUCTORS with practical experience in telephone and telegraph work, to teach fundamentals of electricity four days and evenings. Two openings. Salary $25 per week and bonus end of year. Location New York City. R-2378.

MECHANICAL ENGINEER with technical and practical knowledge of up-to-date mechanical methods to take charge of mechanical department in large sheet-metal specialty plant located in Connecticut. No application will be considered without full information of experience and references. State salary expected. R-2380.

SALES ENGINEER; should preferably be familiar with refrigerating apparatus, but this is not absolutely essential, as salesman of technical experience could very quickly familiarize himself with product. Location New Jersey. R-2381.

RESEARCH ENGINEER to investigate effects of certain types of oil in gasoline engines, young engineer interested in research work preferred. Salary $200 per month. Location New Jersey. R-2382.

MECHANICAL DRAFTSMAN experienced in conveying machinery, if possible; must have at least two years' drafting experience. Salary $30 per week. Location New York City. R-2383.

DRAFTSMAN experienced in structural and reinforced-concrete industrial buildings; must be first-class man. Location New York City. R-2384.

DESIGNERS-DRAFTSMEN-TRACERS; experienced in industrial-plant work. Recent graduates and experienced engineers required. Ten men needed. Location New Jersey. R-2385.

ENGINEER with some experience in wood-working line to act as assistant manager and after trial period to assume full charge of plant. Must be A-1 executive of sound judgment and initiative; hard worker. To right man permanent position with ideal opportunities for advancement is offered. Location Oswego, N. Y. R-2390.

TIME-STUDY MAN with sufficient mechanical experience to design mechanical improvements in machinery being studied. Location Maine. R-2391.

INDUSTRIAL ESTIMATOR able to make estimates from rough sketches for alterations and new work. Must have personality and initiative and be accurate. Man between 30 and 40 years desired. Salary depends upon man. Location New Jersey. R-2387.

INSTRUCTOR IN MECHANICAL ENGINEERING; if possible, some teaching experience and four or five years of responsible experience in industry. Man who has had this practical experience in machine-tool production or in power plant work, or both preferred. Salary $2400 per year of eight months plus $25 a month housing allowance. Location Nova Scotia. R-2389.

STEAM AND ELECTRIC POWER PLANT SUPERINTENDENT to take full charge of oil-fired power station to put it on efficient basis. Technical man, active, good executive, with extensive operating experience especially in the steam end, desired. Property is a 30,000-kw. public-utility plant. Location Texas. R-2392.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month, and the form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

ASSISTANT TO BUSY EXECUTIVE: American, 31; married; technical education; 11 years practical engineering and manufacturing experience in various classes of work and positions ranging from shop employe to works manager. SM-5001.

COMMERCIAL ENGINEER will consider responsible man-size job in New York or metropolitan district; expert on power plant and building equipment, steam, electric, heating, ventilating, etc. Main assets are common sense and will to do, backed by initiative and ready adaptability to new conditions. Twelve years' successful engineering practice in consulting, designing, contracting, supervising, editorial writing and technical advertising along lines mentioned. Salary $4000. Sales proposition on salary and commission or bonus considered. SM-5002.

CONCERN MAKING PUMPS, engines or similar products can secure services of capable superintendent having twenty years' successful experience in every detail of business. Experience not limited to one or two positions in same locality but obtained in several of best concerns in Middle West and East. Technical graduate. SM-5003.

DIRECTOR OF ENGINEERING; technical graduate, just completing 5 years' service as plant engineer for one of largest industrial corporations in country. Mechanical, electrical, and civil engineering. Familiar with purchasing, specification writing, etc. At present directing plant organization of 12 field engineers, 1000 mechanics and number of contractors engaged on contract work. Available January 1. SM-5004.

ENGINEER AND EXECUTIVE; age 37; eight years manager and engineer with engineering and contracting company on steam power plant design and installation and boiler-room economy; good general engineering experience both technical and commercial. Salary $4500. New England or Eastern States preferred, but would consider any location in U. S. A. SM-5005.

ENGINEER EXECUTIVE OR WORKS MANAGER; graduate M.E., 20 years' experience; recently with U. S. Army, officer in charge of district activities, Ordnance Dept.; organization, production, inspection; claims and salvage boards. Manufacturing experience in shops; design, and construction of heavy and special equipment; layout, operation, maintenance and improvement of industrial plants. Location East. SM-5006.

EXECUTIVE ENGINEER; age 28; at present in charge of department, supervising design, construction and sales work of special mechanical equipment for widely-known manufacturer allied to automotive and metal-working industries. Change desired as means of self-betterment. Have thorough shop training, executive, designing and production experience. Salary to suit responsibility. Prefer locating in Central States. SM-5007.

INDUSTRIAL EXECUTIVE; mechanical engineering and legal training; former Army officer; now practicing patent law; connection with manufacturing organization desired; age, 29 years; married; salary open to negotiation. SM-5008.

FACTORY SUPERINTENDENT: American; age 35; experienced in production of brass and steel stampings; modern shop methods; installation piece-work and bonus systems of wage payment; successful in handling men. Available January 1, 1920. Salary $4000. SM-5009.

FOUNDRY MANAGER OR SUPERINTENDENT wants to obtain interest in iron foundry and take over management of it. Graduate engineer, journeyman, molder and patternmaker. Up-to-date on melting, production costs, accounting, buying, etc. Can handle men with tact and get work out. Now saving thousands of dollars with original ideas by reducing losses in foundry and machine shop. SM-5010.

INDUSTRIAL ENGINEER: 25 years' experience in commercial and engineering work in connection with mining and smelting operations. Experience covers design, sales, purchasing and executive work. Age 45, married. Location on Pacific Coast desired. SM-5011.

MANAGER OR GENERAL SUPERINTENDENT: recently discharged officer of A. E. F.

Graduate engineer, 20 years' experience as practical mechanic, master mechanic, superintendent and general manager. Familiar with all details of iron and brass foundries, machine, carpenter, pattern, and forge shops, tool rooms and power plants, cost keeping and office work; successful executive. SM-5012.

MECHANICAL AND SALES ENGINEER; technical graduate; 13 years' experience in design, manufacture and installation of heavy machinery. Expert in design and manufacture of cut herringbone, spur and cast tooth gearing, desires connection with modern concern of high standing in engineering executive capacity where future prospects are good. Age 34, married and employed. Available on thirty days' notice. SM-5013.

INDUSTRIAL OR SALES AGENT FOR NORTHERN EUROPEAN COUNTRIES, graduate engineer planning to leave for northern Europe, wishes to represent American manufacturer of machine tools or of steam auxiliaries or specialties. Particularly familiar with shipyard equipment, marine steam equipment for both boiler and engine rooms, and merchant deck equipment. Conversant in Swedish, Norwegian, Danish and Finnish. Will pay own fare across ocean. SM-5014.

MECHANICAL ENGINEER experienced in general engineering and teaching marine engineering in all its branches, wants permanent position, preferably in New York City. Minimum salary to start $3500. SM-5015.

MECHANICAL ENGINEER; 20 years' experience in practical management of modern central stations, desires connection with large power company in capacity of manager or superintendent of power. Salary $6000. SM-5016.

MECHANICAL ENGINEER; three years as process engineer, and time-study man in plant doing press and light machine work for interchangeable parts; one year in machine room to learn practical side of machine-room problems. M. I. T. man. Desires position as assistant to manager or as process engineer in a growing concern. Connecticut location preferred. SM-5017.

MECHANICAL ENGINEER; M. I. T. graduate; age 27; two years' experience on application and development work, testing of small motors, and works-management investigation; over two years' experience as mechanical engineer for manufacturing plant. At present employed. Desires to get into production and management work or in position along executive lines with industrial concern. SM-5018.

MECHANICAL ENGINEER; age 31; Stevens 1911; recently discharged as engineer officer U. S. N. Experience in operation, design, and sales of power-plant apparatus. Now employed by Navy Department as assistant to engineer in charge of mechanical equipment of large plant. Desires executive position requiring practical knowledge of engineering. Location preferred. New York. SM-5019.

MECHANICAL OR PLANT ENGINEER; technical graduate; assoc. member A.I.E.E. and A.S.M.E.; excellent executive, successful in handling men, tactful and diplomatic; 17 years' experience in electrical and mechanical engineering, including installation and maintenance, power and industrial plant, heating and lighting layout, organization and production engineering. SM-5020.

MEMBER, MECHANICAL ENGINEER; experienced in design and erection of power stations, industrial plants and allied engineering work, desires responsible and permanent position. SM-5021.

MEMBER, TECHNICAL GRADUATE; 37 years old, desires position as works manager, mechanical engineer or mechanical superintendent. Fifteen years' experience in design, construction and operation of power and industrial plants. Ex-service man, recently released. SM-5022.

METALLURGICAL CHEMIST with six years' experience in chemical and microscopical examination of iron and steel; is at present in charge of laboratory of large manufacturing concern but desires change. Age 31, married. SM-5023.

PRODUCTION ENGINEER; shops, and executive experience; results and reference exceptionally good. SM-5024.

PRODUCTION ENGINEER; age 34, married, technical graduate, wishes position with manufacturing concern desirous of standardizing production and cost in accordance with modern scientific methods, with minimum of red tape. Thoroughly experienced in this work and capable of getting it across with the employers in satisfactory manner. SM-5025.

PRODUCTION ENGINEER OR EXECUTIVE; age 44, familiar with all branches of metal-working establishment including costs, systems, systematizing and efficiency methods, and sales; Repair Officer, North Atlantic Fleet, eight months, now Lieutenant on inactive list U. S. N.; best of recommendations. Location immaterial. SM-5026.

PRODUCTION SUPERINTENDENT; age 33. Ten years' experience in telephone work, manufacture of armored cables, conduit, steel tubing, electro-galvanizing, cold rolling, etc. Fifteen months' active service in France as commissioned officer. Good organizer, capable executive, highest testimonials. Salary $3000. SM-5027.

PRODUCTION SUPERINTENDENT OR MANAGER; broad experience as production superintendent in plants requiring accuracy and intensive product; also in supervision of special tooling operations, routing, scheduling and modern methods; successful experience in handling help, can furnish best of references. Location immaterial; at present employed; available on short notice. SM-5028.

POWER ENGINEER; ten years' experience light, heat and power work; installation, operation and maintenance. Thoroughly familiar with all types of prime movers, and all equipment covering central stations, industrial plant or steel works. The last three years of experience in consulting work. Recently discharged from U. S. N. as Ensign. Present salary $4000. SM-5029.

POWER-PLANT ENGINEER; technical graduate, 30 years old. Eight years' experience principally in power-plant design and operation. At present in charge of large steam and gas-power pumping and blowing plant in steel mill. SM-5030.

POWER-PLANT ENGINEER; 41 years of age; technical education; 20 years' experience on power-plant design, construction and supervision. Wide experience in piping design, concrete construction and plant engineering. Has held responsible positions with some of largest concerns in country. SM-5031.

POWER-PLANT EQUIPMENT SALES ENGINEER; technically-trained mechanical engineer, junior member, five years' experience, testing, designing and construction of modern steam-electric plants; at present assistant to chief operating engineer of large syndicate operating public utility properties. Desires connection with sales organization in power-plant or refrigerating-plant equipment field. Age 27; married. Location preferred West or Middle West. Salary or equivalent $2400. Available on thirty days' notice. SM-5032.

PUBLIC UTILITY MANAGER AND ENGINEER; age 37; technical graduate; twelve years' experience in operation, construction, engineering and management of public utilities. Ex-major, construction division; formerly employed as consulting engineer for large corporation and manager of three subsidiary companies furnishing gas, electric refrigeration and heat service. SM-5033.

PURCHASING AGENT; 33; married; seeks high-grade connection with live-wire organization. Knowledge of manufacturing and design of electrical and mechanical appliances; personality that will fit into organization without friction, ability to analyze manufacturing conditions, initiative to get results in new ways. SM-5034.

SALES ENGINEER; young man with technical education; first-class draftsman and tool designer; seeks position with high-class firm that deals in mechanical lines. SM-5035.

SALES EXECUTIVE wants connection with reputable manufacturer or dealer in mechanical products. Has handled steel, ball bearings, and machine tools; experienced both in manufacturing and selling ends. Has mechanical degree and reputation for getting results. American; 28 years old; married. Available after January 1. Prefer headquarters within 200 mile radius New York City. SM-5036.

SALES REPRESENTATIVE FOR PACIFIC COAST; experienced graduate mechanical engineer; 30 years; unmarried; desires to represent one or more well-known firms. Can estimate, analyze conditions, write up catalogues and descriptive data; close contracts, organize and follow up selling compaigns. Available January 1, 1920. SM-5037.

SALES REPRESENTATIVE; 36 years of age, recently released from active duty as Lieutenant, U. S. Navy, desires to represent in Philadelphia reliable company manufacturing marine equipment, oil engines, refrigeration machinery, pumping machinery, oil-burning equipment or any other mechanical equipment requiring an experienced engineer to handle. Would prefer compensation on basis of small retainer for office expenses and commission. SM-5038.

SUPERINTENDENT OF MACHINE SHOP; age 37; 22 years' experience at all branches of machinery trade; executive for past ten years; thorough knowledge of printing-press machinery, automobiles, paper machinery, experimental work, machine tools, electric hoisting machinery, etc. SM-5039.

SUPERINTENDENT OF MECHANICAL EQUIPMENT; technical graduate; 17 years' active engineering experience; superintendent of power plants; plant efficiency, and mechanical superintendent in large industrial plants. Last 10 years in executive charge. Good executive, diplomatic and tactful, familiar with general accounting, plant efficiency, and business methods as applied to industrial-plant operation. SM-5040.

SUPERINTENDENT OR MANAGER; technically trained engineer in addition to being practical mechanic; 20 years' varied experience in essential and special branches; exceptional ability for getting best results from men and equipment, in established concern or working out new enterprises. Desires connection with reliable party in need of high-grade service. SM-5041.

TECHNICAL GRADUATE; 32 years old; 12 years' experience in all departments of industrial management, shop, sales auditing, drafting and engineering. Now employed at $6000 as officer of corporation. Desires to locate in New York State or New England. Available between February 1 and June 1. Qualified to be works manager, office manager or assistant to officer of large corporation. SM-5042.

TECHNICAL SUPERINTENDENT; young, aggressive, well-trained mechanical and chemical engineer; six years in charge of operation in paper-manufacturing industry. Salary $3600 yearly. SM-5043.

WORKS ENGINEER; age 32 years; 10 years' experience; 7 years in responsible charge in office and field of plant layouts, construction, improvement, extension and maintenance, machine design, preparation of machine specifications and purchase; desires change as present position has been affected by ending of war. Salary $4000 per annum. SM-5044.

WORKS ENGINEER OR MANUFACTURING EXECUTIVE; Cornell University graduate in mechanical and electrical engineering; has had more than 10 years' experience in design, construction, operation and maintenance of industrial plants, with consulting engineers and power companies. Permanent connection in eastern United States desired. SM-5045.

YOUNG ENGINEER with six years' broad experience, now employed as mechanical engineer with large machine supply company, desires change. Middle West location preferred. SM-5046.

CONSTRUCTION ENGINEER OR PURCHASING AGENT; mechanical engineer who has been in charge of design and construction work for large corporation in foreign service now available for similar position at home or abroad. SM-5047.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER JAN. 24

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 181.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by Jan. 24, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

California

DICKIE, ALEXANDER J., Editor in Chief, Pacific Marine Review, San Francisco

HENTSCHKE, PAUL, Designer, Western Machinery Co., Los Angeles

HUBBARD, GEORGE M., Acting Chief Engineer, Moore Shipbuilding Co., Oakland

LACASSE, ALBERT H., Engineer, Meese & Gottfried Co., San Francisco

MILLER, ROBERT N., Chief Draughtsman, Main Iron Works, San Francisco

SOCKRIDER, MARION G., Senior Engineer Officer, U. S. S. Comfort, San Francisco

SULLIVAN, GEORGE L., Professor Mechanical-Electrical Engineer, University of Santa Clara, Santa Clara

VANLEER, BLAKE R., Instructor, University of California, Berkeley

Connecticut

APPLETON, CLIFFORD T., Assistant to Equipment Engineer, Bilton Machine Tool Co., Bridgeport

BANKS, WALTER S., Chief Engineer, Bridgeport Brass Co., Bridgeport

BOYNTON, AUGUSTUS S., Director, State Trade School, Meriden

COOPER, JAMES E., Superintendent, Columbia Nut & Bolt Co., Inc., Bridgeport

DUNN, ALBERT L., Tool Designer, Bullard Machine Tool Co., Bridgeport

FERGUSON, DANIEL M., Industrial Engineer, Winchester Repeating Arms Co., New Haven

FIEGE, HENRY J., Foreman, Waterbury Farrel Foundry & Machine Co., Waterbury

HAINES, ELMER B., Assitant Engineer, Travelers Indemnity Co., Hartford

HALPIN, BERNARD S., Superintendent of Wire Mill, Bridgeport Brass Co., Bridgeport

INGLE, HENRY W., Special Machine Designer, Hartford Special Machinery Co., Hartford

JONES, HOBART B., Special Machine Designer, The Fafnir Bearing Co., New Britain

MAYETTE, CHARLES E., Designing Draftsman, Westcott & Mapes, Inc., New Haven

PAINE, ARTHUR P., Process Engineer, Winchester Repeating Arms Co., New Haven

PARKER, HARRY, New Britain Machine Co., New Britain

ROBERTS, HARRY J., Personnel Works, Labor Department, Winchester Repeating Arms Co., New Haven

SCHOELL, REINHOLD, Research Engineer, Yale & Towne Mfg. Co., Stamford

TILLMAN, JOHN R., Sales Engineering, Bullard Machine Tool Co., Bridgeport

District of Columbia

FURLOW, JAMES W., Colonel, U. S. Army, Deputy Chief Motor Transport Corps, Washington

Illinois

DODSON, ROWLAND W., Plant Engineer, George S. Mepham & Co., East St. Louis

GAZDA, A. A., Electrical Engineer, Koestner & Hecht Co., Chicago

KOCHNER, WILLIAM B., Mechanical Draftsman, Barber Asphalt Paving Co., Madison

MINER, NELSON A., Chief Engineer, Illinois Traction System, Riverton

SCHIRMER, GUSTAV, Estimator & Sales Engineer, Whiting Foundry Equipment Co., Harvey

SPERRY, PHILMORE F., Superintendent & Designer, B. & W. Mfg. Co., Chicago

TRBOJEVICH, NIKOLA, Mechanical Engineer, Illinois Tool Works, Chicago

WARNOCK, HARRY R., General Superintendent of Motive Power, Chicago, Milwaukee & St. Paul Rd., Chicago

WERSANT, PETER D., JR., Assistant Lubrication Engineer, Sinclair Refining Co., Chicago

Indiana

DEAN, STUART, Vice-President and Superintendent, Dean Bros. Steam Pump Works, Indianapolis

HUBLER, DAVID V., Draftsman, Duncan Electric Manufacturing Co., Lafayette

LANGFITT, JOSEPH K., Works Engineer, Belmont-Ewart Works, Link Belt Co., Indianapolis

WATSON, CLIFFORD H., Superintendent Building & Maintenance, General Electric Co., Fort Wayne

Kentucky

HUBLEY, GEORGE W., Consulting & Advisory Engineer, Louisville

WALTON, DAVID A., President, C. J. Walton & Son, Louisville

Louisiana

ARTHUR, HAROLD M., Superintendent, Caddo Central Oil & Refining Corp., Shreveport

Maryland

FINEGAN, LEO, Superintendent of Shops, Baltimore & Ohio Railroad Co., Baltimore

HARDING, GEORGE W., Inspector of Construction (Mechanical), Bureau of Yards & Docks, Naval Proving Grounds, Indian Head

JOYCE, CHARLES V., Division Engineer, Washington Suburban Sanitary District, Hyattville

TOWERS, DONIGAN D., Agent, Mt. Vernon-Woodberry Mills, Inc., Baltimore

Massachusetts

CHESNEY, MALCOLM M., Assistant Engineer, E. D. Jones Sons Co., Pittsfield

DANIELS, DWIGHT C., Norton Company, Worcester

HAIGHT, OAKLEY V., Plan Engineer, Tool Division, Hendee Mfg. Co., Springfield

KRAUSE, EDWIN, Industrial Engineer as the Personal Representative, Industrial Interests of J. F. Alvord, Springfield

MAY, ELLIOT D., Draftsman, Baxter D. Whitney & Son, Inc., Winchendon

MAYO, PERCY B., Assistant Manager, Jamison Co., Fitchburg

ROBERTS, DEERING S., Chief Appraisal Engineer, Cooley & Marvin Co., Boston

ROCKENFIELD, WILLIAM A., Assistant General Manager, Baldwin Chain & Mfg. Co., Worcester

Michigan

CALLARD, CHARLES G., Production Department, Olds Motor Works, Lansing

GOOD, CHARLES W., Instructor, University of Michigan, Ann Arbor

Minnesota

ELSNER, WILLIAM H., Chief Draftsman, Great Northern RR., St. Paul

Missouri

ARMSTRONG, LESTER E., Mechanical Engineer, Heine Safety Boiler Co., St. Louis

WILSON, CHARLES H., Sales Engineer, Fairbanks, Morse & Co., St. Louis

New Jersey

BURCHETT, WALTER J., Designer, Slocum, Avram & Slocum Laboratories, Inc., Newark

FRANCIS, CHARLES W., General Superintendent, Gillespie Motor Co., Paterson

FRANCKE, WILLIAM J., Vice President, Francke Co., New Brunswick

JONES, WALTER, Experimental Engineer, Brunswick Refrigerating Co., New Brunswick

NORTON, HOWARD C., Fuel Oil Expert, Standard Oil Co., Elizabeth

SCHEDE, JULIUS W., Assistant Marine Manager, Brunswick Refrigerating Co., New Brunswick

SHORKEY, FRED A., Test Engineer, E. I. du Pont de Nemours & Co., Carney's Point

SPIEGEL, SAMUEL, Draughtsman, Babcock & Wilcox Co., Bayonne

TYLER, JOSEPH B., Construction Engineer, E. I. duPont de Nemours & Co., Carney's Point

VAN WAGNER, WALTER M., Assistant Superintendent, American Agricultural Chemical Co., Carteret

ZWINGLI, CARL T., Cadet Engineer, Babcock & Wilcox Co., Bayonne

New York

ANDERSON, STEN, Mechanical Engineer, N. Y. Steam Co., New York

APPERSON, JOHN S., Engineer in Power & Mining Engineering Department, General Electric Co., Schenectady

BADGE, FRANCIS J., Tool Engineer, Sperry Gyroscope Co., Brooklyn

BONNELL, CLEMENT M., Jr., Ford, Bacon & Davis, New York

BOWSER, STANLEY W., Assistant to Chief Engineer, Nestle's Food Co., New York

BROUSSEAU, EDWARD W., Junior Engineer, Radio Corporation of America, New York

BURCH, THOMAS H. JR., Sales Engineer, Hooven-Owens-Rentschler Co., New York

CARROLL, MICHAEL J., Gas Engine Designer, Dyneto Electric Corp., Syracuse

CARY, JOSEPH B., Operating Manager, Air Reduction Sales Co., New York

CHAMBERS, GEORGE G., Mechanical Draftsman, Richmond Levering Co., Inc., New York

CHAPIN, JOHN J., Development Engineer, Remington Typewriter Co., New York

CLARK, THOMAS S., Chief Engineer & Treasurer, Alphons Custodis Chimney Construction Co., New York

DUNCAN, JAMES R., Engineer, Insulation Department, H. W. Johns-Manville Co., New York

FREIDAY, JAY A., Assistant Engineer, Thomas E. Murray, New York

GESELL, EGBERT G., Agricultural Machinery Engineer, W. R. Grace & Co., New York

GORZO, JULIUS, Engineer & Trader, New York

GRIDLEY, ALLEN H., Assistant Engineer, H. S. Ferguson, New York

GUIDER, JOHN F., General Superintendent, Pierce Arrow Motor Car Co., Buffalo

GUMAER, PIERRE L., The Texas Co., New York

HOFFMAN, ROBERT J., General Superintendent, The Linde Air Products Co., New Yorl.

JONES, JOHN G., Mechanical Engineer, Eastman Kodak Co., Rochester

KIMMEY, HAROLD I., Time Study, Remington Typewriter Co., Syracuse

LAROCCA, CARL J., Tool Designer, Pathe Freres Phonograph Co., Brooklyn

LUND, NELS B., Machine Designer, Carrie Gyroscope Corp., New York

McARDLE, JOHN H., Buyer, W. R. Grace & Co., New York

McDOUGALL, ERIC W., Railway Engineer, W. R. Grace & Co., New York

MACWATTY, FRANK L., Assistant to Assistant Mechanical Engineer, American Hard Rubber Co., New York

MENEFEE, HARRY R., Section Head, Western Electric Co., New York

MERO, JOSEPH M., Mechanical Engineer Senior at Cooper Union Day School of Technology, New York

MEROVITCH, EUGENE B., Niles Bement Pond Co., New York

NETTLETON, GEORGE H., New York

PHILLIPS, JOHN C., Supervising Engineer of Plants, New York Steam Co., New York

ROBINSON, MERRILL P., Eastern Sales Representative, International Filter Co., New York

ROTHMAN, MOSES H., Partner, M. H. Rothman & Co., New York

RUGG, HARRY M., Supervisor of Technical Instruction Educational Council, International Committee Y. M. C. A., New York

SAVAGE, HARLOW D., Vice President, American Arch Co., New York

SEELIGSBERG, LEONARD W., Executive Assistant, McGraw-Hill Company, Inc., New York

SMYTH, HARRY K., Sales Engineer, Niles Bement Pond Co., New York

WALLS, ALFRED J., JR., Draftsman, Western Electric Co., Inc., New York

WILLARD, ALFRED J., Export Lubricating Engineer, The Texas Co., New York

WILLSON, GEORGE T., Assistant Superintendent, DeLaval Separator Co., Poughkeepsie

Ohio

ADDINGTON, HERBERT B., Mechanical Engineer, The H. K. Ferguson Co., Cleveland

BANKS, JOHN, Chief Draftsman, Advance Mfg. & Tool Co., Cleveland

CASTER, JOHN E., Tool Designer, The Cincinnati Milling Machine Co., Cincinnati

ENZ, KARL A., Engineer in Charge of Designing, Wellman Seaver Morgan Co., Cleveland

HUNSICKER, CHARLES R., Resident Engineer, Firestone Steel Products Co., Akron

INGERSOLL, CHARLES B., Assistant Chief Engineer, Upson Nut Co., Cleveland

LEBLOND, HAROLD R., Laboratory Director, R. K. LeBlond Machine Tool Co., Cincinnati

LYONS, WILLIAM H., Mechanical Engineer, Lorain County Electric Co., Lorain

MORRISSEY, RAY L., Representative, The Cincinnati Milling Machine Co., Cincinnati

SKELDON, DAVID F., Vice President, The Joseph L. Skeldon Engineering Co., Toledo

SUTTON, SAMUEL P., Efficiency Engineer, B. F. Goodrich Co., Akron

TIETJEN, OTTO F., Cleveland Tractor Co., Cleveland

WHELAN, RODERICK J., General Manager, The Elgin Machine Co., Elyria

WRIGHT, JAMES C., Engineer, Carnegie Steel Co., Youngstown

Oklahoma

DEBUTTS, DEAN J., Chief Draftsman, Oklahoma Petroleum & Gasoline Co., Tulsa

RICE, F. EDGAR, Chief Engineer, Phillips Petroleum Co., Bartlesville

WAGNER, GEORGE E., JR., Assistant Mechanical Engineer, Sinclair-Cudahy Pipe Line Co., Tulsa

WATTS, JENNETH, Chief Engineer, Oklahoma Petroleum & Gasoline Co., Tulsa

Pennsylvania

ABRAMS, JOSEPH H., B. Abrams, Philadelphia

AYRES, ELWOOD B., 2nd Vice President, Philadelphia Textile Machinery Co., Philadelphia

BEHRINGER, CHARLES R., Watch Engineer, Mercer County Light, Heat & Power Co., Greenville

BRISTOL, EDWARD S., Research Engineer, Leeds & Northrup Co., Philadelphia

CALDWELL, WILLIAM F., Designing Engineer, The Barrett Co., Philadelphia

CLEMENS, ALONZO W., Designing Engineer, Bethlehem Steel Co., Bethlehem

DEAN, ARCHER G., Assistant Superintendent, H. O. Wilbur & Sons, Inc., Philadelphia

DEROSAY, KINGSLEY E., Instructor, University of Pennsylvania, Philadelphia

DUFF, PHILIP J., Assistant to Manager, Ship Construction Division, Emergency Fleet Corp., Philadelphia

FRENCH, STUART K., General Superintendent, Propulsion Machinery Installation, Hog Island

HALLER, HENRY E., President, National Valve & Mfg. Co., Pittsburgh

HOBBS, ELMER E., Engineering Aide, Fuel Oil Testing Plant, Navy Yard, Philadelphia

INMAN, EDWARD R., Patent Attorney, Designer of Special Machinery, Franklin

KENNEDY, MATTHEW M., Engineer of Tests, Navy Yard, Philadelphia

KLOTZ, ALBERT W., Mechanical Draftsman, Valley Iron Works, Williamsport

McVETTY, PERCY G., Industrial Fellow, Mellon Institute of Industrial Research, Pittsburgh

PATTERSON, EDGAR S., Steam Engineering, American Sheet & Tin Plate Co., Pittsburgh

REBER, CARROLL J., Assistant Steam Superintendent, Pittsburgh Service Department, Westinghouse Electric & Mfg. Co., Pittsburgh

SMITH, MARSHALL C., Engineer, The Barrett Co., Philadelphia

SPACKMAN, GEORGE D., Assistant Master Mechanic, Lukens Steel Co., Coatesville

TULL, M. GRAHAM, Draftsman, Barrett Co. Philadelphia

ZERBEY, ARTHUR L., Executive Engineer, F. Q. Hartman, Inc., Danville

Rhode Island

RUSDEN, ETHELBERT, President & General Manager, The Textile Finishing Machinery Co., Providence

South Carolina

STALL, EARLE R., Mill Engineering, J. E. Sirrine, Greenville

Vermont

PRICE, JOHN C., Travelling Engineer, Jones & Lamson Machine Co., Springfield

Virginia

EUSTIS, IRVING N., Lieut., U. S. Navy, Norfolk Navy Yard, Portsmouth

WARTHEN, HARRY J., Superintendent Motive Power, R. F. & P. R. R., Washington Southern Railroad, Richmond

Washington

AITCHISON, CLYDE S., Draftsman, Emergency Fleet Corp., Seattle

West Virginia

KAY, SAMUEL, Mechanical Engineer, Valuation Board, U. S. Explosives Plant, Nitro

WEISSENBURGER, CHARLES O., Vice President and General Manager, Marietta Manufacturing Co., Point Pleasant

Wisconsin

BABUSH, JOSEPH S., Efficiency Engineer, Federal Rubber Co., Cudahy

BANKER, OSCAR H., Chief Engineer, Racine Tool & Machine Co., Racine

MILLER, HARRY G., Electrical Engineer, Valuation Dept., C., M. and St. Paul Railway, Milwaukee

ROBERTS, JAMES F., Assistant Engineer, Hydraulic Department, Allis-Chalmers Mfg. Co., Milwaukee

ZACHOW, CLARENCE W., Shop Engineer, M., St. Paul & Ste. Marie Railway Co., North Fond du Lac

Canada

QUESNEL, NICHOLAS W., Supervisor of Boiler Construction, Estimating, Designing and Erecting, The John Inglis Co., Ltd., Toronto

SCHRAG, CARL N., Manager, Toronto Office, Equipment Specialties, Ltd., Toronto

TREANOR, WALTER C., Chief Inspector of Fog Alarms, Dominion Government, Department of Marine, Ottawa

TRULL, FREDERICK G., Toronto Hydro Electric System, Toronto

WELDON, R. LAURENCE, Mechanical Engineer, Laurentide Co., Ltd., Grand Mere

Cuba

GOWLING, LAWRENCE E., Mechanical Engineer, Havana Electric Railway, Light & Power Co., Havana

France

BREUIL, PIERRE, Consulting Engineer, Nogent-Sur-Marne, Seine

Germany

HAGBERG, ERIC E., Manager, Neuss Works, International Harvester Co., Neuss

India

JAYAM, H. M., Mechanical Draftsman, Central Industrial Workshop, Bangalore

Japan

MURAYAMA, SHIKANOSUKE, Chief Mechanical Engineer, Mitsui Mining Co., Ohmutash, Fukuokaken

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

Maryland

KRYZANOWSKY, CONSTANT J., President, Tungsten Products Company of Maryland, Baltimore

PROMOTION FROM JUNIOR

California

SHATTUCK, CHARLES H., Engineer, C. F. Braun & Co., San Francisco

Connecticut

RITCHIE, AI TRENOWETH, Instructor, State Trade School, Meriden

Indiana

MARKEY, HAROLD L., Mechanical Engineer, Diamond Chain & Mfg. Co., Indianapolis

Massachusetts

DAVIS, ALBION R., Mechanical Engineer, Scovell Wellington & Co., Boston

TAYLOR, PAUL H., Plant Engineer, Bird & Son, Inc., East Walpole

Michigan

PORTER, ROBERT, Vice President, Jaxon Steel Products Co., Detroit

New Jersey

FOSTER, CHARLES C., Assistant Plant Engineer, General Motors Corp., Harrison

New York

ADAMS, THOMAS D., Chief Draftsman, Afton Development Co., Afton (Reinstatement), New York

BECHERT, FRED J., Attorney-at-Law, Mitchell & Allyn, New York

HOAR, JOHN C., Engineer of Machinery, American Locomotive Co., Schenectady

MUDGE, STERLING W., Instructor, Pratt Institute, Brooklyn

Ohio

VALENTINE, FLOYD H., Partnership, Mayer & Valentine (Reinstatement), Cleveland

SUMMARY

New Applications	173
APPLICATIONS FOR CHANGE OF GRADING:	
Promotion from Associate	1
Promotion from Junior	12
Total	186

SUMMARY SHOWING AVERAGE AGE AND POSITIONS OF APPLICANTS ON BALLOT CLOSING NOVEMBER 29, 1919

Average age of applicants:	
Members	38
Associates	45
Associate-Members	35
Juniors	26
Cadet Engineer	1
Chief Engineers	8
Asst. Chief Engineer	3
Construction Engineers	3
Consulting Engineers	3
Designers	10
Draftsmen	7
Chief Draftsmen	8
Electrical Engineers	3
Erecting Engineer	1
Executives (Pres., Vice-Pres., Secy.-Treas., Mgrs.)	19
Foremen	2
Inspector	1
Instructors	1
Maintenance Engineer	1
Master Mechanic	3
Mechanical Engineers	21
Asst. Mechanical Engineers	4
Plant Engineers	2
Power Plant Engineer	1
Asst. Professor	1
Research Engineer	1
Sales Engineers	3
Supervisor	1
Superintendents	6
Asst. Superintendents	4
Testing Engineers	1
Tool Engineers	2
Works Engineer	1
Miscellaneous	21

UNITED STATES GOVERNMENT SERVICE

Colonel	1
Major	1
Captains	2
Ensign	1

In Two Sections—Section Two

Volume 42 Number 2

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

FEBRUARY 1920

A. S. M. E. Affairs

PUBLISHED MONTHLY BY THE SOCIETY
29 WEST 39TH STREET, NEW YORK, U.S.A.

Coming Section Meetings

Atlanta Section.
February 24: At the Georgia School of Technology.
Subject: Building a 30,000-kw. Turbo-Generator Set, by H. E. Bussey. Motion-picture lecture or lantern slides.

Baltimore Section.
February 11: The Development of Long-Distance Electric Power Transmission, by P. M. Lincoln, Consulting Engineer, Cleveland, O.
February 18: The Purchase and Erection of Engineering Equipment, by A. S. Loizeaux, Electrical Engineer, Consolidated Gas Electric Light & Power Co., Baltimore, Md.
February 25: City Planning and Its Relation to Municipal Development, by Nelson P. Lewis, Chief Engineer, Board of Estimate and Apportionment, New York City.
These three lectures, which are to be given in connection with the J. E. Aldred course on engineering practice, will be held on Wednesday afternoons at 4.15 o'clock on the dates given, in the auditorium of the Civil Engineering Building of the Johns Hopkins University.

Boston Section.
February 3: At the Boston City Club at 6.30 p.m. Dinner meeting of A.S.M.E. with A.I.E.E.
Subject: Large Turbo-Generator Units from the Operator's Standpoint. Farley Osgood, Vice President of the Public Service Electric Co., of Newark, N. J., will open discussion; twelve collaborators to follow. Tickets for dinner and meeting, $2.00.

Buffalo Section.
February 24: At the Ellicott Club, 10th floor, Ellicott Square Building.
Subject: Wage Payment, by A. L. De Leeuw.

Cincinnati Section.
February 19: At the Engineers' Club. Joint meeting with members of Engineers' Club of Cincinnati.
Subject: The Engineer and the Markets of the World, by Dean Herman Schneider, University of Cincinnati.

Cleveland Section.
February 14: In the room of the Cleveland Engineering Society, Roof Garden, Hotel Statler, 8 p.m.
Subject: Photographing the Sound of Heavy Rifles at Sandy Hook, by Dr. Dayton C. Miller, Case School of Applied Science, Cleveland, O.
Luncheons are served daily to members and guests (ladies invited) in the dining rooms of the Cleveland Engineering Society, Roof Garden, Hotel Statler.

Eastern New York.
February 20: At the Edison Club Hall, Schenectady, N. Y.
Subject: Performance Tests on Aeroplanes, by A. R. Stevenson, Jr.; and Supercharger for Aeroplane Engines, by S. A. Moss.

Erie Section.
Mid-February: At the Board of Commerce Building, Erie. Speaker: Dr. Ira N. Hollis. Subject to be announced.

Minnesota Section.
February: Subject: Coals and Coal Analysis, by W. D. Langtry, Commercial Testing & Engrg. Co., of Chicago, Ill. Time and place will be announced later.

New Orleans Section.
February 9: At the Louisiana Engineering Society. Subject to be announced.

New York Section.
February 10: At the Engineering Societies Building. Subject: New Uses of Aluminum.

Philadelphia Section.
February 24: At the Philadelphia Engineers' Club. Navy Night.
Subject: War Time Naval Engineering, by Comdr. J. S. Evans, U. S. N., Bureau of Steam Engineering, Washington, D. C.

St. Louis Section.
February 20: At the Midland Valley Country Club, dinner meeting.
Subject: Industrial Fatigue, by C. B. Lord, Mechanical Engineer, Wagner Electric Co.

San Francisco Section.
February 5: At the San Francisco Engineers' Club. Dean Kimball will speak. Subject to be announced.

SOCIETY AFFAIRS

Secretary's Letter—Three Presidents at Worcester—Washington Award to Herbert Hoover—Section Meetings—N. Y. Section Discusses New Fuel Uses—Functions of Engineering Societies in Industries—Personals—Necrology—Employment Bulletin—Candidates for Membership

Service vs. Professional Standing

THE SECRETARY'S LETTER

IN the recent numbers of *Engineering* (London) announcement is made by the Institution of Civil Engineers in the advertising columns of the intention on the part of the Institution to extend its charter by application to Parliament so that it may have the further powers of registering civil engineers and prescribing those persons entitled to be registered to practice the profession of civil engineering.

This is the most important step taken in engineering circles during the month. In England (perhaps more than any other country except possibly in France) the professional standing of an engineer has been more or less determined according to whether he was a member of the Institution—or in France of the Société: There naturally has been a similar inclination in this country to regard membership in one of the national engineering societies as a badge of professional attainment.

On the other hand, there is a fundamental note about which the Secretary commented in last month's letter, not only running through all the professions of America as is evidenced by the Interprofessional Conference, but common to all business in our beloved United States of America, and that is, that the only badge is one's ability to serve his fellow-men. This does not mean we should not have similar safeguards in engineering to those we find in medicine and law. The motive that should actuate us, however, is our desire to render service to one's society and to one's profession and through them to the community.

In this spirit the Secretary is undertaking to bring the Society into contact with the technical features of national and international movements. This month he has attended the conference of the representatives of all the professional employment services in the United States. The extent to which this service is growing in our own immediate joint society activity is remarkable. On the average, during the past few days over 150 professional men have been calling per day. It is customary to give each man individual attention, to secure a personal estimate on the part of the interviewer as well as a written statement of the attainments and personality of the applicant, and in a similar manner assist employers to secure the right talent. There is a very great ambition on the part of the boards of management of the national societies to continue this service free, that is, include it in one's dues to his society. During the war we felt that members would consider it a privilege to have their dues expended in rendering this service to returning soldiers. As soldiers were still arriving in January, some of them professional men, they will be calling for employment service for the first time as much as six or eight months from the date of demobilization, and it is apparent that if we are to continue this service we have started we shall be confronted by a heavy expense for the greater part of this year. Your Secretary, from what he can learn, would caution thrift in the most intelligent and patriotic—man, woman, and child—as the only way to meet the serious condition which will prevail in the United States during the next few months, and if this is practised consistently and uniformly such restrictions as are sure to come will be less burdensome and last for a shorter period of time. On the other hand, the employment service is destined to be taxed, but it would seem as if this was a most essential activity for the National Engineering Societies to maintain. The greatest coöperation has been pledged by your Secretary (who is the chairman of the joint board of the secretaries of the Founder Societies) to the other professional employment services of the United States.

On January 23 was held the first meeting in the history of the engineering profession in the United States, of the Boards of Management of the several societies jointly with the Trustees of the United Engineering Society and the members of Engineering Council. The greatest good will come from this conference in furthering the solidarity of the profession.

THE DEPARTMENT OF PUBLIC WORKS

The conference in Washington on January 13 and 14 of the representatives of nearly 150 societies and business and social organizations was most fruitful. It has been explained that the proposition is to convert the existing department (the Department of the Interior) into a Department of Public Works instead of creating a new department, and so to concentrate the number of Bureaus of the Government now handling these public works. Consequently the rapidity by which this movement can be made successful, depends on the ability of the engineers, now leading, to establish their sincerity and unselfishness. Nothing has so contributed to the possibility of the solidarity of the professional technical men and their association with the civic bodies of the nation as has this one thing.

Like all movements it required the most intimate coöperation of every society, business, civic and technical organization, and the necessary financial support for possibilities of publicity and direction. It is hoped that every one who reads this letter will feel obligated to immediately call up the officer of his local organization, whatever it may be, and offer to assist in the movement. Ours is almost the only important nation which has not already concentrated its public works into one department.

CALVIN W. RICE,
Secretary.

Three Presidents at Worcester

Four Presidents of the A.S.M.E. were scheduled to speak before the Worcester Local Section on January 16. Dr. Hollis was there at Worcester, Mr. Main came from Boston and Major Miller from New York. Dean Cooley was unable to attend as he expected, and so there were three. Incidentally the occasion provided the début of President Miller before the Local Sections, and the local executive committee is congratulating itself on its enterprise in securing the honor for the Bay State.

It was a surprise to many when Major Miller, in opening his remarks, made references to his residence in Worcester in his boyhood days, and all were delighted to hear him recount his local experiences of those years, especially his adventures in the engineering field.

The topic of Major Miller's remarks was Industrial Relations, a subject on which there is none better qualified to speak than he. To the deep interest of his audience, he devoted an hour and a half to relating chapters from the note book of his professional life spent in manufacturing establishments and, during the war, at the Rock Island Arsenal. His advice was a purely business relation between employer and employee—he would have none of benevolent despotism, and soul-redeeming relations—purely the business arrangement for business purposes. He advocated an honest attempt on the part of both sides to play fair and square and avoid unnecessary misunderstanding and trouble.

Major Miller's illustrations were well chosen, and his address was a finished one, and all who had the good fortune to hear him speak could not but be forcibly impressed by the soundness of his reasoning and the logic of his conclusions. All power to his rhetoric for the coming year!

Past Presidents Main and Hollis also spoke gracious words. The trend of Mr. Main's thoughts was the place and present need

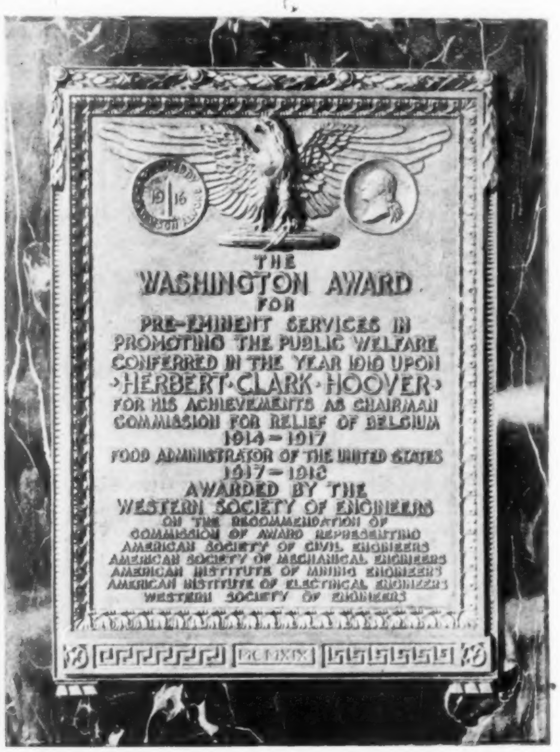
of the "professional" engineer among engineers—in Mr. Main's opinion the engineer of the professional type has a distinct usefulness in a world of engineers turned business men.

Dr. Hollis spoke in his inimitable style, and he treated his audience again to a selection of his limitless reminiscences. In more serious vein, he discussed the present world unrest and by historical illustration proved that all was not chaos, but that the present developments were but the natural processes of the transition of the present-day civilization to a higher order.

Prof. H. P. Fairfield, Chairman of the Worcester Section, presided, and the meeting was preceded by an informal dinner. A delegation from the Boston Local Section and visitors from neighboring towns were present.

Washington Award to Herbert Hoover

The Western Society of Engineers, on the recommendation of its Commission on the Washington Award, representing the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, The American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the Western Society, has named as the first recipient of the Washington Award, Mr. Herbert Clark Hoover, for his achievements as Chairman of the Commission for the Relief of Belgium from 1914-1917, and as Food Administrator of the United States from 1917-1918.



The Washington Award Conferred Upon Herbert Hoover

The award will be presented to Mr. Hoover in Chicago in the latter part of February when he will make an address before the Western Society.

Mr. Hoover is now serving as vice-chairman of the Industrial Commission appointed by President Wilson, having received this appointment as a representative of the engineering profession. He is also nominee for president of the American Institute of Mining and Metallurgical Engineers.

Joseph A. Holmes Safety Association

At the meeting of the Joseph A. Holmes Safety Association, held on March 3, 1919, the Committee on Awards, Diplomas, and Medals was directed to have medals and diplomas prepared for presentation to persons in the mining and metallurgical industry who, in the judgment of the committee, had performed deeds of heroism entitling them to such recognition at the hands of the Association. At the same meeting, the President of the Association was authorized to arrange for the presentation of the medals and diplomas.

On the recent occasion of the dedication of the buildings of the Bureau of Mines Experiment Station at Pittsburgh, Pa., the President of the Association announced the awards which had been made by the committee.

The diplomas and gold medals awarded Robert Brennan, Mary J. Mitchell, Granite J. Frowen, Thomas Cooney, and Madge Dugan, all of Butte, Montana, were presented on November 26 by Daniel Harrington, Mining Engineer of the Bureau of Mines, at the "Miners' Night" opening exercise of the Butte Y. M. C. A.

Technical Inquiries

The Society regularly receives in its mail technical inquiries of all descriptions, which are referred to Committees, to members who are experts on the subjects of the inquiries, and to the Library when the inquiries involve considerable search work among the technical literature. The following titles will show the variety of subjects upon which information is requested.

- Data on machine tools for an Engineering Society in South America.
- Information on roller-chain drives.
- Names of companies which have adopted A.S.M.E. templets for low-pressure and extra heavy flanges.
- Lists of speakers on industrial relations.
- Design and operation of dirigible airships.
- Manufacture of alcohol for industrial purposes from molasses.
- Data on flow of heavy crude oil in pipes.
- Application of Diesel engines to farm tractors.
- Manufacture of iron castings.
- Names of firms manufacturing tinning plants.
- Information on combustion of fuel oil.
- Number of blowers manufactured in this country in certain years.
- Layout of a foundry for manufacture of acid-proof castings.
- Specifications and formulae for making cutting lubricants.
- Burning of rice chaff under steam boilers.
- Manufacturers of safety pins.
- Process and equipment for grinding sulphur to pass 200 mesh.

Members of the Society having similar problems or requiring such data are invited to utilize the clearing house at headquarters to obtain it. All inquiries are referred to a special department and are retained as confidential.

Election of Officers for 1921

The Committee on Constitution and By-Laws held a meeting on January 23 to discuss amendments to the By-Laws to enable the new arrangements for the election of officers to be carried out. The amendments are predicated on the following schedule for the election which has been proposed by the Regular Nominating Committee and recommended to the Council for action.

Jan. 23:	First reading before Council on amendments to By-Laws to permit the following actions in connection with the election of officers.
Feb. 20:	Final action on amendments to By-Laws.
May 22:	Committee to meet in St. Louis and make its nominations.
June 1 to 15:	Nominating Committee forwards names of nominees to Secretary.
July 1:	Names of nominees selected by regular Committee published in Mechanical Engineering.
Aug. 5:	Last day for Special Nominating Committee (if organized) to send in names of its candidates.

Aug. 19:	President appoints Tellers of Election.
Aug. 19:	Secretary mails ballots to voting membership.
Sept. 1:	Names of nominees selected by any Special Nominating Committees (if organized) to be published in Mechanical Engineering.
Sept. 28:	Voting closes.
Oct. 1:	President announces results of election.
October:	During this month President-elect selects names to fill committee vacancies.
October:	President-elect attends Council Meeting.
Nov. 1:	Names of new officers published in Mechanical Engineering.
November:	President-elect attends Council Meeting.
Dec. 7:	New officers inaugurated at Annual Meeting. Standing Committee members terms expire. New Committee members take office.

1920 Year Book

The 1920 Year Book will, it is hoped, be in the hands of the membership by April first.

The Committee on Publication and Papers is restoring the features omitted from last year's edition on account of restrictions on the use of print paper, and the new volume will include the following features: Calendar of events in the Society for 1920; complete list of officers and committees and local sections executive committees; portraits of present officers; general information, brought up-to-date, regarding the Society's affairs and activities; alphabetical and geographical lists of members, about 12,000 names, lists of honorary members, past-officers; calendar of previous general meetings; constitution, by-laws, rules, index, etc.

The Committee on Publication and Papers is introducing a new feature in the arrangement of the alphabetical and geographical lists of members. The alphabetical list will contain simply name and city of residence, and the full information regarding business connections, street and home and mailing addresses, will be given in the geographical list. One of the advantages of the new arrangement will be that full particulars regarding members residing in any particular city can be found from one reference only, whereas under the old arrangement it was necessary to refer back to the alphabetical list for each name required to be looked up. It is also believed that with the present development of the local sections, which now include over 70 per cent of the members, the geographical list is consulted much more frequently than the alphabetical list.

Section Meetings

Atlanta:
January 27. Oil as a Fuel, by Charles M. Rogers, Rogers, Higgins Co.
December 16. Dinner meeting with Mr. Calvin W. Rice, Secretary of the Society: informal affair.

Boston:
January 22. Research. Speakers: Dean John R. Allen, and Prof. A. M. Greene, Jr.

Buffalo:
January 6. Oxy-Acetylene Welding, by Major C. K. Bryce.

Cleveland:
January 27. Rubber Working Machinery, and Clay Working Machinery.

Colorado:
December 26. Dinner Meeting held at the Metropole Hotel, Denver, Colo.

Detroit:
January 9. The Design and Application of Electric Propulsion Equipment for Submarines, by David Hall, Pittsburgh Westinghouse Electric & Manufacturing Co.

Eastern N. Y.:
January 9. Gages, by C. E. Johansson, C. E. Johansson, Inc., New York.

Hartford Branch:
January 19. The Use of Fuel Oil, Particularly in Steam Production, by Ernest H. Peabody, Babcock & Wilcox Co. Certain Aspects of the Fuel Question, by John P. Leask, Gilbert & Barker Mfg. Co.

Minnesota:
January 5. New Problems in Engineering, by Dr. Ira N. Hollis.

New Haven Branch:
January 21. Heat Treatment of Steel.

New Orleans:
January 12. Annual Meeting and Smoker.

New York:
January 13: New Fuel Uses. Speakers: Lindon W. Bates, consulting engineer, on Colloidal Fuel; E. H. Peabody, Babcock Wilcox Co., on Fuel Oil; and C. C. Trump, Fuller-Lehigh Co., on Pulverized Coal.

Philadelphia:
January 27. Modern Boiler-Room Practice, by Norman Reinicker, Supt. of Operation, Lehigh Valley Light & Power Co.

St. Louis:
January 2. New Problems in Engineering, by Dr. Ira N. Hollis.
January 28. Construction of the Old Hickory Smokeless Powder Plant at Nashville, Tenn., by Mr. A. J. Brandt, Engineer, St. Louis Mfg. Co.; joint meeting of the Associated Engineering Societies of St. Louis.

San Francisco:
January 8. The Industrial Uses of Gas, by B. W. M. Henderson, and H. M. Crawford. Mr. M. Balliet, Moore Shipbuilding Co., delivered a paper on Use of Oil Gas in the Manufacture and Heating of Rivets.

Worcester:
January 16. President's Night. Speakers: Major Fred Miller, '20; Dean M. E. Cooley, 1919; Charles T. Main, 1918; Dr. Ira N. Hollis, 1917.

New York Section Discusses New Fuel Uses

The Metropolitan Section of The American Society of Mechanical Engineers held its first meeting of the year on the evening of January 3. New Fuel Uses was the topic for discussion and three papers were presented. E. H. Peabody spoke on Fuel Oil, Lindon W. Bates on Colloidal Fuel, and C. C. Trump on Pulverized Coal. The meeting was largely attended despite the fact that it had not been given wide publicity. Frederick A. Scheffler, of the Fuller Engineering Company, presided.

Mr. Peabody, of the Babcock and Wilcox Company, in discussing the subject of fuel oil, outlined the development of oil burners, furnaces, and conveying equipment. He called attention to the necessity and importance of proper furnace design, and showed by means of lantern slides numerous installations of various types of devices for the burning of oil. He also discussed the question of operating costs, and in connection therewith gave the following handy rule, calling particular attention to the fact that like all ready rules it must be used with due consideration to existing conditions. This rule is: When the cost of coal in dollars per ton (long ton) is double the cost of oil in cents per gallon, then the fuel costs of making a definite amount of steam are approximately the same. This does not include, however, the cost of labor, which, as is well known, is always in favor of oil.

Mr. Peabody showed a series of test curves recently made by the Navy Department, and which established a new world's record, as $1\frac{1}{2}$ lb. of oil was consumed per square foot of heating surface per hour with an efficiency exceeding 76 per cent. This represents an evaporation of $22\frac{3}{4}$ lb. of water into dry steam per square foot of heating surface per hour from and at 212 deg. At low rates the efficiency was well above 83 per cent. These figures were presented with the permission of the Navy Department, which will shortly publish a complete account of the tests during which they were obtained.

Lindon W. Bates, who spoke on colloidal fuel, gave considerable detailed information regarding the components of that fuel and discussed at some length its special qualities. He also told of its future probable uses and stated that anthracite and bituminous coals, as well as lignites and peats, can be satisfactorily used for the manufacture of colloidal fuel. Mr. Bates reviewed some of the tests made for the British Admiralty, which faced a most serious situation in relation to its fuel supply throughout the war, and more particularly during the early months of the year 1918.

The final speaker of the evening, C. C. Trump, of the Fuller Engineering Company, outlined by a series of slides developments in the uses of pulverized coal. At the present time there are 25 installations which have been using pulverized coal for at least a year, and eight more are now in the course of construction. He stated that from 12 to 15 million tons of pulverized coal are annually consumed, nearly 80 per cent of this being used in the

cement industry and the remainder in metallurgical processes and under boilers.

Mr. Trump described an interesting type of conveying system used in pulverized-coal installations which consists of a screw feeder through which there is admitted a small amount of compressed air. This gives the pulverized coal characteristics more nearly like those of oil. This screw feeder is connected to a pipe line through which the coal can be continuously pumped, either from one bin to another or from hoppers to the pulverizing plant. Mr. Trump stated that because of the small amount of air admitted no dust collectors are necessary, a small stovepipe being sufficient to take the air from the coal.

Student Branch Meetings[1]

Armour Institute of Technology:
December 13, 1919. Business Meeting—Plans for conduct of future meetings discussed.

Carnegie Institute of Technology:
October 23, 1919. Mr. Pfonts of the Division of Industries gave a talk on the work of the School.

Case School of Applied Science:
November 20, 1919. "The New American Note in Industry," Mr. Jones of the Sherwin Williams Company.
December 11, 1919. "The Handling of Men," by Mr. Willard Beahan.

University of Cincinnati:
December 19, 1919. Motion picture on "The Use and Abuse of Twist Drills," through the kindness of the Cleveland Twist Drill Company.

University of Colorado:
December 4, 1919. "The History of the Industry of Prepared Roofing," by Mr. Orris.

Georgia School of Technology:
October 13, 1919. Business Meeting.

Iowa State College of Agriculture and Mechanical Arts:
November 20, 1919. Mr. Austin Burt, General Manager of the Electric Light and Gas Company, Waterloo, Iowa, spoke on his experiences since graduation.
December 11, 1919. Business Meeting.

Kansas State Agricultural College:
September 25, 1919. Business Meeting.

University of Kansas:
November 6, 1919. "Collective Bargaining," by Mr. Peckham. "Organization of Labor," by Mr. Hoyt.
November 20, 1919. "Drilling Rig," by Mr. Sherman.
"Refining Processes," by Mr. Bonebrake.
"Oil Shale," by Mr. Jakowsky.
December 4, 1919. Aviation.
(a) "Theory of Flight," by Mr. Bower.
(b) "History of Flight," by Mr. Love.
(c) "Types of Planes Used at the Front," by Mr. Garvey.
(d) "Aviation—Its Present and Future," by Mr. C. White.

Massachusetts Institute of Technology:
The Mechanical Engineering Society meets on the last Friday of every month.

University of Michigan:
November 12, 1918. "Relations of Mechanical Engineering to Coast Artillery," by Colonial Arthur, head of the R.O.T.C. at the university.

University of Oklahoma:
November 16, 1919. "History of the Liberty Motor from the Period of Its Design to the Time of First Completed Motor," by Dean J. H. Felgar.
"Improvement in Boiler Design," by Earl Bartholomew.
"The Combination Gas and Steam Engine," by L. W. Scranton.

Pennsylvania State College:
November 19, 1919. Business Meeting.
December 10, 1919. An outline of the A.S.M.E. Annual Meeting was given by Dean R. L. Sackett and Professor E. A. Fessenden.
December 17, 1919. "Heat Transmission," by Professor A. J. Wood.

Stevens Institute of Technology:
October 22, 1919. "Wooden Ships," by Mr. West.

Virginia Polytechnic Institute:
November 13, 1919. Business Meeting.

Washington University:
Four business meetings have been held this year for the purpose of re-organizing the work of the Student Branch.

[1] At a recent meeting of the Council a petition for the establishment of a Student Branch at Lafayette College, Easton, Pennsylvania, was granted.

University of Wisconsin:
October 15, 1919. Business Meeting.

Worcester Polytechnic Institute:
November 14, 1919. "The Day's Work," by Doctor Ira N. Hollis.
December 12, 1919. Illustrated lecture on "Accident Prevention in Industrial Plant," by Mr. George H. Bigelow.

PERSONALS

In these columns are inserted items concerning members of the Society and their professional activities. Members are always interested in the doings of their fellow-members, and the Society welcomes notes from members and concerning members for insertion in this section. All communications of personal notes should be addressed to the Secretary, and items should be received by February 15 in order to appear in the March issue.

CHANGES OF POSITION

Earle L. Zwally, formerly associated with the Mitchell Motors Company, Inc., Racine, Wis., has become connected with the Automotive Corporation, Pittsburgh, Pa.

S. E. Flexer has become affiliated with the Fuller Engineering Company, Allentown, Pa. He was, until recently, connected with the Hercules Cement Corporation, Nazareth, Pa.

Lester W. Gill, formerly professor of electrical engineering, Queens University, Kingston, Ont., Canada, is now director of technical education, Department of Labor, Ottawa, Canada.

Laurence Dowling, recently assistant engineer, American Sugar Refinery Company, New York, has entered the employ of Jno. Dunlop's Sons, Spring Valley, N. Y.

Luther A. Davis, formerly production superintendent of the Standard Screw Company, Corry, Pa., has become associated with the Pressed Steel Company, Cleveland, O.

Winfred S. Boynton has accepted the position of mechanical engineer with the Hudson Motor Car Company, Detroit, Mich. He was formerly associated with the Nelson Blower and Furnace Company, South Boston, Mass., in the capacity of assistant chief engineer.

Graham L. Montgomery has accepted the position of industrial engineer with Lockwood, Greene and Company, New York. He was formerly in the employ of the Wilputte Coke Oven Corporation, New York, in the capacity of erecting engineer.

Lewis H. Miller has assumed the position of mechanical engineer with The Cromwell Steel Company, Lorain, O. He was until recently connected with the Babcock and Wilcox Company, Barterton, O., as designing engineer, plant engineering department.

Thos. J. Fitzgerald, formerly chief engineer Midvale Steel and Ordnance Company, Eddystone Rifle Plant, Eddystone, Pa., has assumed the duties of vice-president and works manager of The Sturdi-Truck Manufacturing Company, Holyoke, Mass.

John J. Eyre has become designing engineer with the Simplex Wire and Cable Company, Cambridge, Mass. He was until recently connected with the Sturtevant Aeroplane Company, Boston, Mass., in the capacity of factory engineer.

Thomas Brady has severed his connection as production manager with the Elevator Supplies Company, Inc., Hoboken, N. J., and is now connected with the Ivers-Lee Company, Newark, N. J., as factory manager.

Roy E. Brakeman, who has been chief engineer of the Fairfield Works of the American Steel and Wire Company, Fairfield, Ala., is now chief engineer of the Otis Steel Company, Cleveland, O.

P. D. Wagoner has resigned as president of the Elliott-Fisher Company, Harrisburg, Pa., manufacturers of billing machines, etc., to become connected with the General Motors Company, New York. He will remain on the board of directors.

Gustav A. Merkt, since 1917 chief engineer for the American Tube and Stamping Company, Bridgeport, Conn., has assumed similar duties with the Clinton-Wright Wire Company, Worcester, Mass.

William J. Moore, who for the past three years has been connected with the Singer Manufacturing Company, Elizabethport, N. J., as mechanical engineer, has resigned to accept the position of chief

engineer of Fashion Park, clothing manufacturers of Rochester, N. Y. Mr. Moore is in charge of construction, maintenance and manufacturing equipment.

Burt A. Waltz, formerly assistant mechanical engineer, Osborn Engineering Company, Cleveland, O., has become connected with the Portage Rubber Company, Akron, O., as chief engineer of their rubber plant, manufacturing tires, hoof pads, and mechanical goods.

Ernest O. Zacharias, formerly process engineer, Remington Arms Union Metallic Cartridge Company, Bridgeport, Conn., has accepted the position of mechanical engineer, Babcock-Bishop-Becker Company, Cleveland, O.

Louis J. Schneider, until recently sales manager, Harrison Radiator Corporation, Detroit, Mich., has been made director of sales of the Clark Tructractor Company, manufacturers of a 3-wheeled gasoline driven industrial transportation unit. The main sales office is located in Chicago.

W. D. Hemmerly, formerly of the Tabor Manufacturing Company, Philadelphia, Pa., the Acme Wire Company, New Haven, Conn., and production superintendent at the Naval Aircraft Factory, Philadelphia Navy Yard, has become associated with The Thompson and Lichtner Company, consulting engineers in industrial management and construction, Boston, Mass.

D. Vaughn Waters has severed his connection with Gould and Eberhardt, Newark, N. J., as designing engineer, and is now associated with the Ivers-Lee Company, Newark, N. J., as assistant to the chief engineer.

Paul E. Breneman has resigned his position as chief draftsman of The Edward G. Budd Manufacturing Company, Philadelphia, Pa., after an association of 5½ years, to accept the position of chief engineer, All Steel Body Division, C. R. Wilson Body Company, Detroit, Mich.

C. Morton Beattie has assumed the duties of assistant mechanical engineer, George E. Keith Company, Campello, Mass. He was formerly associated with the Bethlehem Shipbuilding Corporation, Ltd., Fore River Plant, Quincy, Mass., in the capacity of mechanical draftsman.

Richard S. Bull, recently sales manager, Whitlock Coil Pipe Company, Hartford, Conn., has become associated with Bradner Smith and Company, Chicago, Ill.

Clifford F. Hutchings, formerly connected with the Hayward Company, New York, has entered the employ of the Blaw-Knox Company, New York.

Eugene A. Murphy has resigned as purchasing engineer of The B. F. Goodrich Company, Akron, Ohio, to accept a similar position with The Denby Motor Truck Company, Detroit, Mich.

Donald S. Linton, formerly connected with the Pratt and Whitney Company, Hartford, Conn., has entered the employ of Warner and Swasey Company, Cleveland, Ohio.

John D. Crawford has recently become associated with the Wellman-Seaver-Morgan Company, Akron, Ohio, in an engineering capacity. He was formerly consulting engineer, in charge of research and development, Maryland Pressed Steel Company, Hagerstown, Md.

Thomas R. Cook, until recently general works manager, Willard Storage Battery Company, Cleveland, Ohio, has become affiliated with the Westinghouse Union Storage Battery Company, Swissvale, Pa., in the capacity of vice-president and general manager.

Frank A. Turner has assumed the position of chief engineer with the Flexible Automotive Tire Company, of Boston, Mass. He was, until recently, chief engineer of the Becker Milling Machine Company, Hyde Park, Mass.

Alexander Vallance has left the employ of the American Machine and Manufacturing Company, of Atlanta, Ga., to become associated with the Ordnance Engineering Laboratory of the Holt Manufacturing Company, Peoria, Ill., in the capacity of assistant engineer.

W. H. Shafer, formerly works manager of the Triumph Electric Company, Cincinnati, Ohio, has assumed the duties of secretary and assistant manager with the Ahrens-Fox Fire Engine Company, of the same city.

Frederick H. Rittenour has severed his connection with the American International Shipbuilding Corporation, Hog Island, Pa., to accept the position of development expert, power department, under the General Staff, U. S. A., at Camp Taylor, Ky.

Thomas D. Banks has resigned his position as superintendent, Division of Garbage and Refuse Disposal, City of Columbus, Ohio, and has accepted the position of chief engineer with The Marion Tire and Rubber Company, Marion, Ohio.

David J. Jenkins, formerly junior fuel engineer, U. S. Bureau of Mines, Pittsburgh, Pa., has become associated with the Dallas Power and Light Company, Dallas, Tex.

ANNOUNCEMENTS

E. H. Peabody has resigned from the marine department of The Babcock and Wilcox Company, New York, to take up independently the development of fuel oil.

E. R. Kenner, formerly district manager for the South and Southwest with Wellman-Seaver-Morgan Company, has been transferred to the home office to assist H. P. Glidden, engineering sales manager.

Gustav Hirsch, who has returned from France after ten months' service abroad, has opened an office in Columbus as general consulting and construction engineer. In 1917 he was commissioned Major in the Signal Reserve Corps, being promoted to Lieutenant-Colonel in May 1919.

Charles F. Lacombe, recently honorably discharged from the Army, has been commissioned Lieutenant-Colonel in the Engineering Reserve Corps, U. S. A.

E. M. Herr, president of the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., was chairman of the Ecuador group at the second Pan-American financial conference, held at Washington, January 12 to 17.

James W. Cox, Jr., has opened an office in New York, for the practice of textile engineering.

C. F. Rogers, who during the entire period of the war served as chief Government inspector on the Vickers and Browning machine guns, both ground and aircraft types, has joined the sales organization of C. E. Johansson, Inc., Poughkeepsie, N. Y., in the capacity of special representative.

William J. Fisher, superintendent of A. B. Farquhar Company, York, Pa., has been elected president of the Engineering Society of York.

Frank O. Wells, president of the Greenfield Tap and Die Corporation, has sold his entire holdings to Frederick H. Payne, vice-president. Mr. Wells retires as president and member of the board of directors and Mr. Payne has been elected president in his place. Francis G. Echols, vice-president and general manager, has been elected a director of the corporation to fill the vacancy caused by the resignation of Mr. Wells. Mr. Wells will remain with the corporation in an advisory capacity.

Robert W. Rogers has completed the installation of training at the Wilson Foundry and Machine Company, Pontiac, Mich., and is now production training consultant with office in Newark, N. J. Mr. Rogers was prominent in one of the earliest successful introductions of vocational training course in the country—in the brief courses established in the shops of the Erie Railroad.

John M. Saalfrank, formerly of Waterbury, Conn., who for the past eleven years has been designing and mechanical engineer with the DeLong Hook and Eye Company, of Philadelphia, Pa., has resigned and has opened a consulting engineering office in the same city.

Clarence Goldsmith, who has been engineer for the National Board of Fire Underwriters for the past twelve years, and late Major in the Construction Division of the Army, has been placed in charge of the branch engineering office recently established by the National Board in Chicago, from which questions pertaining to the application of the standard schedule for grading cities and towns with reference to their fire defenses and physical conditions in the middle west will be handled.

H. H. Blee, who has recently resumed his engineering work with the State Engineering Department of California, has been commissioned a Major in the Aviation Section, Officers' Reserve Corps, U. S. A. Major Blee served throughout the war as a Captain of Air Service, his assignment being that of chief of one of the technical departments of the Airplane Engineering Division.

E. R. Feicht, formerly assistant superintendent of plant of the Bridgeport Brass Company, Bridgeport, Conn., has been made superintendent of plant of the same company.

APPOINTMENTS

George A. Weschler, formerly associate professor of mechanical engineering, The Catholic University of America, Washington, D. C., has been appointed professor of mechanical engineering at the University.

NECROLOGY

GEORGE RHODES CULLINGWORTH

George R. Cullingworth, vice-president of the Garvin Machine Co., New York, died on December 15, 1919. Mr. Cullingworth was born on August 25, 1837, in Manayunk, Pa., then a suburb of Philadelphia. He attended public school there until about sixteen years of age, when he entered business with his father in Philadelphia, where he served his apprenticeship.

From 1857 to 1870 he was connected for varying periods with the following firms: Bennett, Dougherty & Sons, Philadelphia; Colt's Armory, Hartford; the Starr Armory, Yonkers; the Trenton Arms Co., Trenton, and the E. E. Garvin Co., New York. In 1870 he formed a partnership with Mr. Sargent in the Hydraulic Machine Co., New York. During this period he worked on the erection of the elevated railroad in New York City, inventing the ticket chopper which is now in use. For twenty years Mr. Cullingworth was associated with the Ingersoll Rock Drill Co., New York, as vice-president and as president. He sold his interest in this firm to become connected with the Garvin Machine Co., with which concern he spent the last twenty-two years.

Mr. Cullingworth was a member of the General Society of Mechanics and Tradesmen of the City of New York. He became a member of our Society in 1884.

ALDEN R. MEEK

Alden R. Meek, manager of the New England district for the Westinghouse Electric & Manufacturing Co., died on November 11 in Harrisburg, Pa., of typhoid.

Mr. Meek was born on January 24, 1886, in Houtzdale, Pa. He was educated in the public schools of Harrisburg and later attended Pennsylvania State College, from which he was graduated in 1909, receiving his post-graduate degree in electrical engineering in 1914. Before entering college, Mr. Meek obtained his shop experience at the Harrisburg Foundry & Machine Works. Upon graduation he became connected with the Ridgway Dynamo & Engine Co., Ridgway, Pa., and was with this concern until 1917, when he resigned from his position as manager of the Boston office to become sales engineer in the turbine section of the power department of the Westinghouse Co. During the war he supervised the company's interests in Washington, D. C., returning to take the position of paper and rubber specialist in the industrial department, later becoming supply manager of the New England District.

Mr. Meek became an associate-member of the Society in 1918.

WILLIAM T. ENGLISH

William T. English, president of the W. T. English Co., Boston, died on December 22, 1919. Mr. English was born on July 21, 1855, in Baltimore, Md. The family moved to Boston when he was a child and he was educated in the schools of that city. He served his apprenticeship as patternmaker with the Boston Machine Co., and then entered the employ of the Boston Blower Works. In about four years he was advanced to the position of works superintendent. His leisure time at this period was devoted to the study of mechanical engineering.

In 1895 Mr. English became connected with the Walworth Construction & Supply Co., as construction engineer, resigning in 1903 to become president of the Walworth-English Fleet Co., with which concern he was associated for fourteen years. For the last two years Mr. English was engaged in business for himself under the name of the William T. English Co., Boston.

Mr. English belonged to several fraternal organizations. He became a member of the Society in 1902.

EDWARD T. WALSH

Major Edward T. Walsh was born in April, 1872, in South Orange, N. J. He obtained his technical education in Pratt Institute, Brooklyn, and was for some years connected with the maintenance department of the New York and Brooklyn Bridge. Later he became connected with the Atlas Portland Cement Co. as a designer of power-plant and building equipment in their mechanical department. From 1901 to 1906 he was employed by the Interborough Rapid Transit Construction Co. as draftsman, resigning to go to Dayton, Ohio, as construction engineer with the National Cash Register Co., where he superintended the construction of several large factory buildings.

From Dayton Major Walsh went to Philadelphia, where he continued his work in the design and construction of industrial buildings, becoming associated in 1909 with Frederick A. Waldron in industrial engineering; one of his notable undertakings at this time was the construction of the large service station for the Edison Illuminating Co., Boston, Mass.

Shortly after the opening of the world war Major Walsh became chief engineer of the Canadian Car & Foundry Co., New York, which handled a number of large shell contracts for the Russian Government. He also spent nearly one year with the Maxim Munitions Corporation on a cartridge contract at Watertown, N. Y. When the United States entered the war he was commissioned as major in the Ordnance Department, serving in some of the most active divisions of the work. Following the armistice, he was connected with the salvage board of the Western New England District, and at the time of his death, January 13, 1920, was chairman of this board.

Major Walsh became a member of the Society in 1913.

FUNCTIONS OF ENGINEERING SOCIETIES IN INDUSTRY

President of British Institution of Mechanical Engineers Discusses Opportunity of Organized Mechanical Engineers

IN his presidential address before the Institute of Mechanical Engineers of Great Britain, Dr. Edward Hopkinson spoke of the effects of the war on the industry and profession of mechanical engineering, whose interests it is the function of all engineering societies to conserve and promote. He described the lessons war has brought to mechanical engineers, which the societies must mark and learn if they are to adequately discharge the duties of this calling. Dr. Hopkinson said in part:

We are entering on a new decade which may well prove as difficult and critical as that we are leaving behind. We can achieve success only by years of patient and strenuous work, whose keynote must be the national unity of effort in war translated into our industrial life. Industry must be reorganized with methods, personnel and plant more efficient, more productive, and more perfectly adapted to their purpose. As mechanical engineers, we ought to realize that both the direction and the execution of this reconstruction lie largely with us. It is fitting, therefore, that we should leave no stone unturned in seeking out and eliminating the causes of our past failures and in finding means whereby we can best satisfy present and future industrial needs.

ADMINISTRATION AND ORGANIZATION

The exigencies of war have taught us much and have, I think, brought to the fore a considerable number of young engineers of natural administrative and organizing capacity. But administration and organization cannot be left entirely to natural aptitude, even when combined with long experience. There can be little doubt that in the future our shops must be managed by younger men, of more limited personal experience than has been customary hitherto, who will therefore need to rely to a greater extent upon the experience of others, acquired through reading and lectures. These questions of management and organization are vital matters which ought not to be left to chance and should form part of the specific training of a mechanical engineer.

The full freedom of industries in availing themselves of the new mental material turned out by the technical schools and colleges has been hampered by the innate conservative prejudices of the so-called practical man. The man from the technical schools, however brilliant, could not hope to obtain recognition as a useful member of the administrative staff until he had been through a mill of two or three years of what is designated practical training, during which he could earn no remuneration and might count himself fortunate if he was not called upon to pay a premium for the privilege of working. His heart was often broken by the drudgery of repetition work coming at a time of life when minds are most receptive and fullest of desire to be of use and to absorb new ideas. The war has changed the outlook of the works manager. He has begun to realize that the man who has the advantage of wide reading and of thorough technical training, provided he has a natural practical bent, may make a far better under-manager than the man who has not these advantages, but has spent a much longer time in the workshop. One reason which has militated against the more rapid absorption of the product of the technical schools as an integral part of workshop organization is to be found in the fact that too little time is given in the schools to teaching the art of production.

The right use of tools and the accommodation of design to the methods of manufacture and to the tools available receive too little attention. Many lectures are devoted to the design and working of a dynamo or steam engine, but few to that of a lathe or milling machine. How often are parts of scientifically correct design incapable of being molded economically in the foundry or tooled economically in the shop?

Engineers have had an unhappy experience in this respect during the war through having to carry out Government designs, the product

of the drawing office without regard to the works, designs unchastened by the necessity of having to hold their own in the world's markets. Yet, I do not believe that it is impossible to inculcate the basic principles of economical production in the classroom, the laboratory and the workshop of the technical school as effectively as, and certainly in a much shorter time than, in the factory. If such subjects were widely taught, the student would soon discover in what direction lay his natural bent and would in his own mind specialize in that direction, and when he came to the workshop, would be able to show that he could readily absorb shop training in his own specialized subjects and make himself useful therein. If a man, soon after leaving college can show that he is capable of occupying a definite post in workshop organization, it will qualify him to pass from one works to another and so to obtain experience of different conditions and methods, and, as is most desirable, in countries other than his own. Happily, the war has done much to break down the prejudice against interchange of experience in the engineering industry, for, where almost all have been forced by circumstances to turn from work to which they were accustomed to other work of quite different character which had to be carried out under pressure of extreme urgency, managers soon found out how much they could help each other, and in responding to the national need came to realize the advantages of coöperation.

Our Institution also has an important part to play in this respect. Much can be done by encouraging the reading of papers which deal with workshop organization and with production from tools. There has been already a noticeable increase in papers of this character, and I hope it will continue. I do not agree that the discussion of these problems will tend toward advertisement, lower the general scientific status of the papers, or emphasize unduly the purely commercial aspect of works production. A description of the means adopted by a works manager to obtain maximum production of the required degree of accuracy at minimum cost is as important to the progress of mechanical engineering as the description of a new invention.

There is another side of engineering at which it is too often the custom of engineering institutions to look askance, namely, that concerned with the distribution and selling of the product. In most industrial engineering undertakings, the commercial section of the staff is larger than the designing, testing, and foreman section, and it is just as essential to the highest success that it should be composed of trained engineers. A very large proportion of the men who enter engineering works with the intention of fulfilling their calling on constructive work find that they are drafted, through the force of circumstances, to the commercial side, and develop their careers in that direction. No salesman of high-class engineering products can be altogether successful unless he has the engineering instinct and has had a sound engineering training. The successful engineer-salesman must be able to understand and enter into the wants of the purchaser and suggest means for satisfying them. He must also understand thoroughly the properties and capabilities of what he has to sell. It is a common though erroneous idea that a man ceases to be an engineer when he becomes involved in the commercial side of engineering. On the contrary, it often happens that in discharging his commercial duties he is using to the best advantage his engineering knowledge and aptitude.

In a recent paper read before the Institution of Electrical Engineers, entitled "The Functions of the Engineer, his Education and Training," Lieutenant-Colonel O'Meara discussed in great detail the extent to which teaching in the subjects of administration, organization, and commercial management "indispensable to the complete engineer" should form part of the curriculum of engineering education. His conclusions are based on the fact, too little recognized by those responsible for the conduct of our technical colleges, that in after life a far larger proportion of engineering students find their vocation in the administrative rather than in the technical side of industry.

In mechanical engineering, perhaps more than in any other branch of technical science, the inventor, the designer, and the research worker must keep in constant touch with the workshop organization. This interdependence should be recognized throughout his college training. For the average man it may be necessary to cut down the hours spent in higher technical work and devote the time so gained to administrative and commercial subjects, and for the exceptional man to postpone some of his higher technical work to a later part of his college career.

Whatever may be the steps taken to widen the curricula for engineering students, it is essential that those occupied in administrative duties should recognize that successful administration is based on principles which are capable of definition and of scientific treatment and analysis, that the accumulated experience of others can be put into a form in which it can be taught and learned, and that those mental and moral characteristics which are essential in the good administrator can at least be developed, if not implanted by training.

We must not, however, be content with teaching only those who are to administer our works and factories. We shall never get the best out of any system of organization or administration in any field of work unless the workers themselves understand the principles upon which the system is based. A wise manager in an engineering shop will make no changes without first explaining their object to the workers, probably through the medium of the Works Committee. A still wiser manager will so develop the interest of the workers in efficient administration, that proposals for improvement originate with them, and they thus assume the position of having to prove their case. With this in view, it is most important that there should be evening classes in administrative subjects in our technical schools.

Largely due to the experience gained during the war, the need for systematic instruction in industrial administration has been so prominently forced on the attention of those responsible for the conduct of some Lancashire engineering and other industries, that a year ago six firms combined to make an offer to the Manchester Municipal College of Technology to provide an annual sum for the establishment of a special department for this purpose. The department has been constituted and is worked in close coöperation with an Advisory Committee of those who are themselves engaged in works administration. A director has been appointed with three assistants. The objects of the department are stated in the prospectus to be:—

1 To study scientifically all questions regarding industrial management and to collect and coördinate the information obtained.

2 To use all knowledge gained with the object of furthering the education of managers, workers and students.

3 To assist in building up a science of industrial administration, and as far as possible to work out its applications to all British industries.

The material side is only one part of works administration: not less important is the purely human factor. All that pertains to the physical health and mental contentment of the workers is reflected in the efficiency of their work. We have, in many respects, paid far less attention to these matters than the Germans, the Swiss, or more particularly the Americans, but it is significant that the Director of the new Department of Administration in the Manchester College of Technology is a physiologist.

Comparatively little work has been done in England in the quantitative measurement of variations of productive power dependent upon the hygienic conditions of the workshop, and yet in many cases it is possible to establish a definite relation between them. Largely due to lessons taught by war conditions, it has become a recognized practice in well-organized works to appoint welfare superintendents and apprentice masters whose function is to promote healthy conditions of mind and body for the workers. Such officials can abundantly justify their position.

The most important problems in the human side of administration are those connected with industrial fatigue. The efficiency of a man as measured by his capacity for output is dependent upon his hours of work, both in length and distribution, and the integration of the curves connecting rate of output with time of work will show the maximum amount of work which can be obtained from the individual. The investigation of these questions on a scientific basis is of a peculiarly difficult nature on account of the large number of independent variables which affect the result. It may be shown, for instance, that a workman's output is actually greater when working 48 hours a week than when working 53, but such a conclusion may be inapplicable generally because the greater capacity for work may be due not merely to the shorter hours, but to the fact that the shorter hours provide a better distribution of work-time and playtime. For example, the shorter hours may enable the before-breakfast hours of work to be completely abolished, and this may have salutary effects dependent upon quite other factors than length of working hours. Again, to arrive at results capable of wide application, observations must be made over long periods, the object being to ascertain the conditions necessary for the continued maintenance of human effort at its maximum efficiency.

Thus observations limited in time might show that it would be better to add the hours of Saturday morning's work to the five other working days in the week and thus insure two clear days, but more extended observation might show that instead of two days' freedom from work in the week, it was better to allow the hours of leisure to accumulate and insure a month's complete holiday in the year. Another difficulty is the fact that as yet physiologists have not discovered any definite means of measuring fatigue or of determining the state of the body at any particular time with regard to fatigue. Many experiments and much observational work have been carried out with a view to finding such a measure, but with only limited success, and at present the only measure of capacity for work at a given time appears to be the actual rate at which work is done at that time. This is obviously unsatisfactory, because it introduces many factors other than the purely physiological ones of fatigue. It is, for example, a well-known fact that the maximum rate of work does not occur after relaxation. It takes time, as it were, for a man to get into his stride. These are probably psychological effects and not purely physiological.

The appointment last year of the Industrial Fatigue Research Board by the Department of Scientific and Industrial Research and the Medical Research Committee jointly, at the request of the Home Secretary, shows the importance attached to a comprehensive and systematic investigation of these problems. It is the duty of the Board to consider and investigate the relations of the hours of labor and of other conditions of employment, including methods of work, to the production of fatigue, having regard in this investigation both to industrial efficiency and to the preservation of health among workers.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society records.

ENGINEER with 3 or 4 years' experience since graduation in testing laboratory. Work will be special investigations involving laboratory-research work and also factory testing of electrical apparatus. Applicant must be above average in alternating current theory, with experience in test department of large manufacturer. Laboratory experience in electrical measurements desirable. Location New York City. R-2403.

ELECTRICAL ENGINEERS OR PHYSICISTS especially interested in illumination or photometry. Openings also for chemical engineers in research work. Positions are with government bureau. Recent graduates considered. Salary $1200 per year and up. R-2404.

YOUNG ENGINEER of sound technical training desired in connection with development of new high-frequency electrical apparatus. Good grasp of physical and mathematical fundamentals important. Signal Corps experience useful. Permanency assured. Location New York City. R-2405.

JUNIOR RESEARCH ENGINEER; long-established industrial organization in rapidly expanding field has attractive opportunity for young man of first-class ability and thorough training in electrical engineering or technical physics. Postgraduate training desirable, but not insisted upon. Prospects limited only by ability. Salary proportionate to education and record. Location New York City. R-2406.

DEVELOPMENT ENGINEER; young engineering graduate wanted for experimental development work on electrical apparatus. Distinctive opportunity for young man of energy, resourcefulness and supervisory capacity to grow with new engineering developments of a fundamental nature. Salary determined by qualifications. Location New York City. R-2407.

MECHANICAL DRAFTSMAN to work on motor-truck dumping body; must be able to make detail drawings and inspect shop work. Will lead to sales position. Must have good personality and be single. Salary $30-$35 per week. Location: New York City, traveling in vicinity. R-2408.

RECENT GRADUATE for power-plant layout work. Location New York City. R-2410.

MARINE DRAFTSMAN for hull and engine work. Location Staten Island. R-2412.

ASSISTANT ENGINEER to reorganize department for company manufacturing steam and electric hoist and grab buckets, and to take charge of design; will be in charge of drafting room. Location Boston, Mass. R-2413.

ENGINEER with practical experience in manufacture and sale of zinc sulphate, zinc chloride, or other zinc salts. R-2414.

RECENT GRADUATES for statistical work. Salary $25 per week. Location New York City. R-2416.

METALLURGIST with experience on airplanes for testing machines and writing specifications. Salary $45-$50 per week. Location Garden City, L. I., N. Y. R-2418.

MECHANICAL ENGINEER to make improvements on present machinery for company manufacturing belts. Location Chicago, Ill. R-2421.

ESTIMATOR for plant located in Eastern Pennsylvania, about 150 miles from New York; and including foundry machine, structural, forge and pattern shops, etc. Rare opportunity to connect with fast-growing, progressive organization. In replying state age, education, qualifications, references, past experiences and salary expected. R-2422.

ENGINEERS to design, construct and operate sugar refinery. Thoroughly competent men desired for new refinery just starting in Canada. Salary $4000 per year. R-2423.

METALLURGISTS: must be experienced and capable of personally conducting or supervising tests for large manufacturing company. Two openings. Location New York State. R-2426.

DRAFTSMEN WANTED to lay out construction plans and mechanical equipment for large power house. Location Connecticut. R-2427.

CHEMICAL ENGINEER to have charge of operation of small unit for production of filters for gas-mask canisters. Not necessary to have any great knowledge of this phase of work. Must combine willingness to work with some understanding of practical manufacture, and must be able to install and operate control laboratory for testing finished product. Government position. Salary $2500-$3000 per year. Location Maryland. R-2428.

REINFORCED-CONCRETE DESIGNERS, with extensive experience on industrial building work. Location Detroit, Michigan. R-2430.

MECHANICAL ENGINEER for position with company manufacturing street signs, warning signals, etc. Location New York City. R-2431.

TRANSITMAN. Location Yonkers, New York. R-2433.

MASTER MECHANIC, for company manufacturing iron, steel and edge tools operated by water power. New England man preferred. Location Connecticut. R-2436.

MECHANICAL DRAFTSMAN to work out details from sketches and general drawings. Prefer one with experience on elevator or conveyor work. Location New York State. R-2440.

PLANNING DEPARTMENT EXECUTIVE WANTED for factory employing normally 900 men; manufacturing steam turbines and centrifugal pumps; business growing rapidly; location and facilities unexcelled; position involves complete charge of scheduling and following up of raw material and manufacturing processes on all orders; position reports directly to works manager; salary entirely dependent on ability to assume responsibility and to get results. Application should give in detail experience and shop and office training which would qualify for such a position, give references and state salary expected. R-2441.

CIVIL ENGINEERING GRADUATE with two or three years' experience for position with large industrial corporation. Location New Jersey. Application by letter; state age, education, experience, when available, minimum salary, etc. R-2442.

FIRST CLASS DRAFTSMAN with some general mechanical ability. Must be capable, neat and thorough; knowledge of mechanisms and details essential. Prefer man with considerable experience in drafting. Location New York State. R-2443.

MACHINE-TOOL DETAIL DRAFTSMAN: must be A-1 man in this line of work. Location Newark, N. J. R-2446.

ELECTRICAL ENGINEER with first-class experience in both large and small transformer engineering. Would go into transformer engineering department of large manufacturing company as assistant engineer. Duties will include much special development work. Location Indiana. R-2447.

FUEL-OIL ENGINEERS and other specialized engineers in petroleum industry; must be particularly high-class men, preferably college graduates with engineering degrees; must have pleasing personalities and should be capable of handling high-class commercial work as well as the actual running of comparative tests, etc., in various kinds of plants. Location Illinois. R-2449.

SUPERINTENDENT for reinforced-building construction. Location Pennsylvania. R-2450.

CHEMIST with experience in routine analysis of iron ores. Technical graduate of recognized college; single, about 24 years of age desired. Location West Africa. Healthful tropical climate. Two year contract. Will live in town of approximately 1000 whites. Salary $175 per month, plus traveling and living expenses. R-2451.

SURVEYOR for general field work. Civil engineering graduate, single, about 24 years old and with 2 years' experience desired, for position in West Africa. Healthful tropical climate. Two year contract. Will live in town of approximately 1000 whites. Salary $175 per month, plus traveling and living expenses. R-2452.

GENERAL MANAGER for company manufacturing complete line of rubber-covered wire ranging in size from lamp cord to mining machinery cable. Applicant must thoroughly understand business. Company's financial position and standing in the trade are good. Will sell stock, on favorable terms, to experienced and qualified man. R-2453.

ANALYTICAL RESEARCH CHEMIST for experimental laboratory. Industrial experience required. Salary $45 per week. Location Newark, N. J. R-2454.

DRAFTSMEN, topographical and mechanical, for work with U. S. Government in Alabama. Salary $150 per month. R-2456.

SALESMAN for machine tools. Salary $40-$50 per week. Location Brooklyn, New York. R-2457.

ENGINEER; expert in the manufacture of toy transformers. Only man with thorough knowledge of manufacture of large quantities of toy transformers can qualify. Location New Jersey. R-2461.

EXECUTIVE with accounting experience for work with company manufacturing small machinery parts. Location New York City. R-2462A.

RESEARCH FELLOWSHIP IN ACOUSTICS has been established for the encouragement of investigation in this science; at middle western technical institution. Candidates must be college graduates and have at least one year of advanced study in physics. Stipend is $1000 per year. Location Ohio. R-2465.

MAN CAPABLE OF TAKING CHARGE OF BUILDING MACHINE TOOLS; must have had experience building high-grade machine tools and be good executive. In reply state experience, age, salary expected. Location Massachusetts. R-2473.

MECHANICAL ENGINEER to take charge of mechanical engineering of live concern. Must be capable of designing tools, jigs, fixtures, special machinery; supervise others on this work; and manage engineering department and drafting room in the most efficient manner.

In reply state experience, age, salary expected. Location Massachusetts. R-2474.

MECHANICAL OR ELECTRICAL ENGINEER familiar with gas engines, test work, etc.; must be graduate engineer; some sales experience desirable. Location New York City. R-2485-A.

MECHANICAL ENGINEER to act as assistant to manager; must be acquainted with office details, follow up systems, etc.; some sales experience desirable. Location New York City. R-2485B.

MECHANICAL ENGINEER: recent graduate for production work, for company manufacturing subway gratings. Location Long Island City. R-2489.

STRUCTURAL DRAFTSMEN experienced on detailing and checking. Rates will range from $135 per month up, depending entirely upon the man's experience and ability to handle our line of work. Five openings. Location Cleveland, Ohio. R-2491.

YOUNG CHEMICAL ENGINEER for position in industrial laboratory to test raw materials and help in solution of problems connected with manufacture of rubber. Must be technical graduate. Location New York State. R-2492.

OPERATING ENGINEER; must be technical graduate with considerable experience in construction, operation and maintenance of hydraulic and steam generating plants and overhead and underground transmission and distribution systems. The present system includes a 20,000 kw. hydroelectric plant and two auxiliary steam plants, 44,000 volts and 12,000 volt transmission system and 2300/4000 volt distribution system with ten substations. Will have direct charge of operation and maintenance of entire system. Applicant must have had similar work and responsibilities with central station company. Location Chicago, Ill. R-2493.

ENGINEER OF PLANS AND RECORDS; to take charge of division, the work of which consists of the preparation of plans, specifications and estimates for all additions to or changes in the present generating, transmission and distribution systems, inspection of all work and keeping of records of operation, construction and maintenance. Also necessary that the men be qualified to take charge of operation of system during absence of operating engineer. The man for this position must be technical graduate with experience in the design, operation and maintenance of central station systems with some experience in general office methods and systems of records. Must also have experience in the preparation of plans, specifications and estimates for work in connection with central station properties. R-2494.

YOUNG MEN with education and possibilities for growth, to start in our manufacturing plant with the idea of learning business. Unnecessary to have any technical education, but there would be certain advantages to man with chemical or mechanical engineering training. Good opportunity. One or two openings. Location New Jersey. R-2496.

METALLURGIST for middle-west plant doing case hardening of small parts. Technical man with some experience and exceptional ability for getting things done is required. Location Indianapolis, Ind. R-2497.

EXCEPTIONAL — NOT AVERAGE — YOUNG TECHNICAL MAN for shop executive position in Indiana manufacturing plant, employing 800. Man with real possibilities who is seeking an opportunity to demonstrate his capacity is required. Experience, while helpful, is not of greatest importance, as it is expected to give him proper training. In application give education, accomplishments, and small photo, if possible. R-2498.

RECENT GRADUATE to take charge of machine and other parts of business of company manufacturing heating apparatus. Must have technical education, common sense and executive ability. Is wanted to aid in developing the business. Location New York State. R-2500.

YOUNG ENGINEERS FOR STEAM-TURBINE WORK. Company wishes to give several young technical graduates nine months' engineering apprenticeship, with a view to fitting them for the openings which occur from time to time, especially in engineering and sales departments. Must have energy and caliber which will fit them to eventually hold responsible positions. Location Connecticut. Give details of training and experience when writing. R-2501.

TURBINE CALCULATOR, thoroughly familiar with thermodynamic design of impulse turbines of Curtis and Rateau types. This position can be made broader than a calculator's job, for a man of good judgment, experience and ability to teach an assistant. Location Connecticut. R-2502.

MECHANICAL ENGINEER to go into the factory engineering department of large manufacturing company to develop into an all round man. At first, work will consist of specifying and ordering machine tools. Excellent opportunity to get general factory experience. Salary $28 to $35 per week. Location Indiana. R-2504.

DRAFTSMEN for design of radio apparatus. Position at radio laboratories, Camp Alfred Vail (Little Silver), New Jersey. Pay $2100 to $2500 per annum. Give details as to age, experience and references. R-2505.

MECHANICAL OR ELECTRICAL ENGINEER with experience in design of radio apparatus to take charge of drafting room. Position at radio laboratories, Camp Alfred Vail (Little Silver), New Jersey. Pay about $3000 per annum. Give details as to age, experience and references. R-2506.

ASSISTANT EDITOR; for *The Electric Journal*, 1204 Keenan Building, Pittsburgh, Pa. Must be technical graduate, have a pleasant personality, originality and imagination. Young man preferred. Salary dependent upon qualifications. R-2508.

EMPLOYMENT MANAGER: mechanical engineer under 30, with experience in this line of work. Location New York City. R-2510.

MAINTENANCE ENGINEER to take charge of electrical power plants and steam turbines on phosphate rock-producing property. Westinghouse turbines installed. Liberal salary. Location Nichols, Florida. Living conditions reasonably desirable. R-2511.

MASTER MECHANIC for work in a bleachery plant. Location New Jersey. R-2512.

WELL-ESTABLISHED COMPANY in middle west manufacturing electrical devices, wiring material, outlet and switch boxes, fittings for conduit and armored cable, and the like, wishes to employ competent engineer, with experience in designing such material, to develop additional lines for it to manufacture and to improve its present product. Location Pennsylvania. R-2513.

MECHANICAL, MARINE AND STRUCTURAL DRAFTSMEN; nine openings for experienced men, one of whom must have had patent office experience. Salary $45-$50 per week. Location New York City. R-2515.

PRODUCTION ENGINEER for position with company manufacturing drying ovens; must be mechanical engineer; will have entire charge of factory. Location Connecticut. R-2518.

MECHANICAL ENGINER; good executive who understands automobile business, to have full charge of plant. Location Massachusetts. R-2519.

INSTRUCTOR in surveying and mechanics, from February to June. Salary $150-$175 per month. Location Penn. R-2520.

RECENT GRADUATES to qualify as chemical engineers, gas operators, electricians, etc., in plant of large manufacturing company. Location Tenn. R-2527.

RESEARCH ENGINEER. Excellent opportunity for right man, with one of the largest concerns of its kind in the United States. Location Chicago. Must be technical graduate with 8 or 10 years of general engineering experience, including designing, experimental engineering, compilation of data, planning and working out of an assigned subject. Must have initiative and tact. Write, giving references, age, experience and salary. R-2529.

CIVIL OR MECHANICAL ENGINEERS; familiar with mechanical and structural design work, thoroughly experienced, good executives and thoroughly capable of pushing work in field, to take charge of construction and installation of general mechanical equipment of factory. Two openings. Location Philadelphia, Pa. R-2530.

RECENT GRADUATE, preferably M. E., from school of recognized standing to do experimental industrial engineering with opportunity to advance. Location Philadelphia. State full experience and salary expected in first letter. R-2531.

ENGINEERING DRAFTSMAN; young engineers, preferably technical graduates with some industrial experience. Work will cover designing of machinery, buildings, etc., laying out of transmission lines, equipment and other work in connection with a manufacturing plant. Location, home office of Hercules Powder Company, Wilmington, Delaware. Apply Engineering Department. R-2534.

MASTER MECHANIC with good machine-shop and power-plant experience. Two openings; one in England, the other in the United States. Z-1.

ASSISTANT HEAD for construction and repair department of large chemical plant. Must have had five or six years' general experience on actual building construction, erection of machinery and maintenance of equipment. Technical graduate preferred. Location New Jersey. Z-5.

MILL SUPERINTENDENT OR FOREMAN to take charge of two hundred ton cyanide mill treating silver ores at Guanajuato, Mexico. Must have had employment in similar capacity. Mexican experience and knowledge of Spanish desirable, but not absolutely essential. Salary $300 per month. Z-11.

INDUSTRIAL ENGINEER experienced in handling of coal and clays. Company has problem at one of the plants that it desires to have studied and a report made thereon with a view to effecting economies. Location Missouri. Z-18.

FOUNDRY SUPERINTENDENT; must be thoroughly versed in foundry practice for ordinary gray-iron castings. Majority of work will be of high-grade small castings, ornamental work, etc., with occasional large casting; model foundry comprising brass, aluminum and white metal departments. Salary $75 per week approximately. Location Hoboken, N. J. Z-19.

MECHANICAL ENGINEER wanted by firm of consulting engineers. Experience required in design of construction of steam, gas and refrigerating plants. Liberal salary paid commensurate with breadth of experience. In applying present a record of education, experience, salary desired and such other information as may be of interest. Location North Carolina. Z-20.

YOUNG ENGINEER, technical graduate, to assist in testing and research department. Knowledge of combustion and boiler tests is requisite. In writing give references, experience and age. Location Detroit. Z-21.

INDUSTRIAL RELATIONS DIRECTOR; age 30 to 40 years, with about 10 years' experience in manufacturing industry, preferably in production work and about 2 years in employment work; broad-gage and high-class man wanted. Salary approximately $4000-$5000. Location Rochester, New York. Z-22.

RECENT GRADUATE in industrial chemistry; not over two years out of college. Salary depends on experience. Location Rochester, New York. Z-23.

METALLOGRAPHER, about two years out of school, experienced in tool and alloy steel, for research work; opportunity to branch into sales or operation. Location Latrobe, Pa. Z-37.

INSTRUCTOR for machine-shop methods, freehand drawing, machine design, internal-combustion engines (gas and gasoline) and automobile repairs and construction (for full or part time) work. Location New York City. Z-38.

TEXTILE ENGINEER for three months' work, experienced in textile machinery. Location town near Boston, Mass. Z-42.

RECENT GRADUATE MECHANICAL ENGINEER; for task setting and layout work. New Jersey man preferred. Salary $30. Location Newark, New Jersey. Z-44.

FIRST-CLASS TECHNICAL FOREMAN to have charge of service and repair work on Cadillac, Dodge, Franklin, Nash and Overland automobiles and trucks. Location Lawrence, Mass. Z-45.

MECHANICAL ENGINEER, familiar with machine-shop production, for research work in press room of publishing company. Good personality and tact important; over 30 years old, with about four years' experience. Location Philadelphia, Pa. Z-46.

ASSISTANT TO ELECTRICAL ENGINEER for general utility work with light and power company; technical graduate, with 2 or 3 years' experience, preferably on testing. Location Poughkeepsie, N. Y. Z-47.

CIVIL ENGINEER, preferably a graduate with 2 or 3 years' experience, for general building and structural work, including transmission line structures, surveys, etc. Location N. Y. State. Z-48.

MECHANICAL ENGINEER, preferably a graduate with 2 or 3 years' experience, for plant layout, boiler and turbine testing, etc. Would be assistant to mechanical engineer. Location New York State. Z-49.

EXPERIENCED DESIGNER of internal-combustion engines for operation on both gasoline and kerosene. Technically-trained man essential. In reply, give details of education, experience and qualifications. Z-51.

EXPERIMENTAL ENGINEER in plant of 4000 employees. Must be thorough mechanic and abundant experience, imagination tempered with sound common sense and ability to arrive at a definite goal. Only first-class men need apply. Location Central New York. Z-52.

SALES ENGINEER for New York City and vicinity. A young engineer, graduate preferred, but essentially a salesman, experienced selling pumping machinery, steam engines, boilers and general power plant accessories. This is good opportunity with progressive organization. Z-53.

COMPETENT ENGINEER, who has specialized in the mechanical handling of raw materials such as coal and clay, for position with large manufacturer of refractories. Z-54.

DESIGNING ENGINEER of fractional horsepower motors; should be capable of handling, designing and testing. Excellent opportunity for young engineer with ability, as the company is now being organized. Factory will be located in Middle West. Applications will be treated as strictly confidential. Z-55.

CONSTRUCTION SCHEDULE ENGINEER: young, energetic technical graduate, with several years' experience in estimating and handling construction enterprises. Would be expected to keep construction program lined up in order to finish work on date set. Location Minnesota. Z-56.

DRAFTSMEN WITH EXPERIENCE IN MECHANICAL AND ELECTRICAL LINES for position with company manufacturing radio and electrical equipment. Two openings. Salary $35 per week. Location New York State. Z-57.

CONSTRUCTION DRAFTSMAN; one capable of designing and making working drawings of modern mill buildings. Prefer man of good habits; below twenty-eight years of age; and with Mechanical or Civil engineering training. Location Virginia. Z-58.

ENGINEER with experience in the design and production of tractors; must be practical engineer familiar with manufacturing and able to handle details of engineering department. Location Alabama. Z-59.

PATENT ENGINEER; must be technical graduate and be able to prepare new engineering developments for patent protection. Qualifications: Inventive ability, excellent general theoretical knowledge in chemistry, physics and engineering, as much knowledge as possible of manufacturing and knowledge of patents. Must have ability to take engineer's ideas and expand them into broad patent claims. Excellent opportunity for man of theoretical and scholastic tastes. Location Connecticut. Z-60.

ASSISTANT WORKS ENGINEER: experienced on shop layouts, tool and machine design, as well as pipe layout and general industrial building work. Majority of work will be on board to start. Opportunity for hustler. State training experience and salary expected. Location Western New York. Z-61.

PRODUCTION AND SALES MANAGER for concern manufacturing house-heating and house-boiler apparatus; company employs between 400 and 500 men. Salary $10,000 per year. Location New York State. Z-67.

GALVANIZER; graduate engineer to take executive charge of galvanizing department and look after production and organize department. Must know galvanizing business to teach green force. Position is with chemical industrial plant at present smelting gold and copper. Location New Jersey. Z-68.

CEMENT COMPANY in Philippine Islands wants technical man, expert in Portland cement, and possessing good executive ability. Fifty-one per cent of the capital of the company is held by the government of the Philippines and 49 per cent by private capital. State terms and conditions under which employment would be accepted. Z-69.

ASSISTANT ENGINEER for water works. Desirable that applicant have had some water-works experience. Plant is rapidly growing and there is considerable amount of new construction under way. Salary $150 per month. Location Nebraska. Z-76.

ASSISTANT ENGINEER with experience in transmission and differential work for position with company manufacturing automobile gears. Must be thoroughly familiar both with production, manufacture, and operation. Salary $250-$300 per month. Location Ontario, half hour from Buffalo. Z-77.

GENERAL EXECUTIVE able to survey and organize entire undertaking of coated-paper containers proposition. Experience should cover manufacture, production, design, accounting, banking, collection, audits and sales, which is most important. Position requires analytical, resourceful man able to keep his sales development in line with sound manufacturing development. Salary $5000-$8000. Location New York City. Z-78.

METALLURGICAL CHEMIST, first class, who understands chemistry of high-speed alloy steels, and has had at least five years' experience in steel industry. Electric-furnace experience also essential. Must be technical graduate. Work is chiefly in connection with production, but there will be some research involved. Man 28 to 30 years desired. Opportunity exceptional. Send complete information in first letter. Salary $3600-$4000. Location Cohoes, New York. Z-79.

INSTRUCTOR in mechanical drawing with two years' experience in teaching; some shop practice desirable, but not essential. Salary $1500-$2000 per year. Location Massachusetts. Z-80.

INSTRUCTOR in woodworking; should have shop experience and understand wood finishing. Two years' teaching experience required. Salary $1500-$2000 per year. Location Massachusetts. Z-81.

INSTRUCTOR in general chemistry; two years' teaching experience required. Salary $1500-$2000 per year. Location Massachusetts. Z-82.

MECHANICAL DRAFTSMAN with centrifugal pump experience. Location New York City. Z-26.

SALES ENGINEERS: mechanical or chemical engineering graduates with some sales experience if possible; with military service during the past war; and with a willingness to start at a moderate salary, with good prospects for advancement. The initial salary will be about $1800 for year. Headquarters Ohio. Z-85.

TECHNICALLY-TRAINED, EXPERIENCED EXECUTIVE to take charge of a plant manufacturing a line of electrical machinery, both a. c. and d. c. Must be thoroughly experienced along electrical manufacturing lines and be able to guide design as well. Location Chicago, Ill. Z-86.

LARGE MANUFACTURER OF POWER EQUIPMENT seeks general manager for rapidly growing plant employing approximately 5000 men. Must be thoroughly experienced executive, trained in intensive manufacturing. Location Chicago, Ill. Z-87.

DRAFTSMAN, experienced in heating and ventilation, for position with consulting engineer; duties will include some construction work. Salary $2000 per year. Location New York City. Also opening for recent mechanical graduate. Z-89.

DESIGNERS, experienced either in structural steel and reinforced-concrete industrial buildings, mechanical plant-layout work, or designing retorts and chemical machinery. Several men required for each of these lines. Location New York City. Z-90.

TOOL DESIGNER of jigs and fixtures for machine parts for position with company building presses for sheet metal work. Salary $45. Location Brooklyn, N. Y. Z-92.

MECHANICAL ENGINEER, capable of taking over management of machine shop making high class textile machinery. Exceptionally good opportunity for right man. Location Massachusetts. Z-94.

MAINTENANCE ENGINEER: with about 5 years' drafting experience; will be required to do some drafting as well as set up machines. Mature man desired. Salary $175-$200 per month. Location New Jersey. Z-95.

STRUCTURAL STEEL DETAILERS AND CHECKERS for positions in Bethlehem, Pa. Forty-four hour week. Good working and living conditions. Permanent positions. Application by letter. Z-96.

MACHINE DESIGNER: preferably one with experience on automatic machines of moderate size. Very desirable opening for right man. Dickinson Cord Tire Corporation, 250 West 54th Street, City. Ask for Mr. Cilley. Z-97.

MECHANICAL ENGINEER not over 30 years of age, for architect's office to act as liaison between architect's office and consulting engineer. Must be experienced in heating, ventilating, power plant and machinery layouts. Location New York City. Z-98.

ELECTRICAL DRAFTSMAN, familiar with layouts, wiring diagrams, etc., for mill and power-house work. Work consists of layout for steam and hydroelectric power plants, transmission line work, switchboard layouts, and distribution in mills. Capacity of work runs into thousands of kilowatts in some installations. Man who can make accurate calculations on electrical requirements, work up drawings, and trace them needed. Location New York City. Z-100.

INSTRUCTOR for 60-hour course on non-textiles to be given in training school for teachers of retail selling. Course must be non-technical in sense that it is not meant for work in any of these lines but for teachers of salespeople who must know their goods from the sales point of view. Location New York City. Z-101.

PURCHASING AGENT with engineering experience in all kinds of machinery and tools connected with export business. Salary $1800 plus per year Location New York City. Z-103.

ENGINEER to take charge of manufacturing plant making electrical-safety devices. Man who has had mechanical-engineering training desired. Location Detroit, Michigan. Z-105.

SOUTHERN UNIVERSITY wishes to appoint either full or an assistant professor in the department of mechanics to teach analytical mechanics and strength of materials beginning February 1. Thoroughly trained, energetic, enthusiastic man desired. Salary depends upon training and experience, but cannot exceed $3000 for present year. Location West Virginia. Z-106.

SUPERINTENDENT OF SHOPS and instructor in machine-shop practice, assistant in machine-shop practice, instructor in surveying and mechanician are desired, by southern university. Location West Virginia. Z-107.

YOUNG ENGINEER for rating and underwriting of automobile insurance risks for the United States. Must be willing worker, good at mathematics, agreeable and ambitious. Preferable that applicant know something about the various makes of automobiles. Location New York City. Z-108.

COMPRESSOR DESIGNER for full or spare time to help develop small high-speed and high-grade compressor; must know from actual practical experience all ins and outs connected with the manufacture of small compressors, cost, special tools and methods, etc.; liberal pay for expert assistance. Location New York City. Z-109.

SMALL D.C. GENERATOR DESIGNER, with knowledge of costs, sources of supply, manufacturing methods, and ability to complete electrical data, for full or part-time work. Must have practical experience. Man acquainted with brush arc-type machine preferred. Liberal pay for real expert. Location New York City. Z-110.

INDUSTRIAL ENGINEER; large firm of industrial engineers is constantly on lookout for qualified high grade men. They need not be technical graduates but it would be advantageous. Must have successful executive-manufacturing record and be experienced in organization, management, production control, incentives, manufacturing methods and processes stores control, employment and personnel work and have some knowledge of cost accounting. Should have practical knowledge of operation of machine tools, metal or woodworking or both. Men who have had experience as general managers, works managers, factory managers, superintendents, production managers, etc., are type desired. Applicant would be located in different localities for average of six months at a time. Salary commensurate with ability. Location Chicago, Ill. Z-111.

SUPERINTENDENT OF MAINTENANCE for foundry employing 1500 men, and making motor castings. Openings also for (a) plant engineer, and (b) designing engineer for new layouts, conveying machinery, and mill buildings. Location Michigan. Z-112-A-B.

INSTRUCTOR FOR HEAD OF CIVIL-ENGINEERING DEPARTMENT of a Southern University. Not less than thirty years old, with some experience both in teaching and practice, and having had a little graduate study in addition to degree from recognized engineering college. Appointments are permanent during good behavior and proper efficiency. Salary $2100 for 8½ months' work during the first year and $2300 per year thereafter. Location Florida. Z-113.

ENGINEER experienced in design of industrial concrete buildings, outside experience desirable but not essential. Location New York City. Z-114.

MECHANICAL ENGINEER with actual shop practice and experience in the design of automatic machinery. Location New Jersey. Z-115.

SALES ENGINEER: Young man, technical education, practical experience in operation of steam equipment essential; sales experience desirable, but not necessary. Chicago territory. In first letter give full particulars of education, experience, age, salary desired, etc. Also inclose photograph. Z-118.

FIRST CLASS GENERAL MECHANICAL DESIGNING DRAFTSMEN for power house and industrial plant work. Salary $250 to $275, according to ability. Location Connecticut. Z-120.

CHASSIS TESTER AND INSPECTOR for electric vehicles. Duties to be road testing, mechanical inspection and running in of electric vehicle chassis, as well as inspection of workmanship on chassis and bodies. Location Mt. Vernon, New York. Z-121.

AUTOMOBILE DESIGNER for work on automobile chassis. Experienced man desired, but recent graduate who is good draftsman will be considered. Location Mt. Vernon, N. Y. Z-122.

RESEARCH GRADUATE ASSISTANTSHIPS in Engineering Experiment Station of the University of Illinois are open to graduates of approved American and foreign universities and technical schools prepared to undertake graduate study in engineering, physics or applied chemistry. Appointment must be accepted for two consecutive collegiate years, at the expiration of which period if all requirements have been met, the degree of Master of Science will be conferred. Annual stipend $500. For additional information address: The Director, Engineering Experiment Station, University of Illinois, Urbana, Ill. Z-123.

INSTRUCTOR IN MECHANICAL ENGINEERING for the coming year at well known technical school. Location New York State. Z-124.

ASSOCIATE EDITOR for leading technical journal. Requirements: experience on power machinery, tact, judgment. Permanent position with advancement ahead. Give details of experience. Z-125.

DRAFTSMEN checkers, designers, detailers and estimators, with experience on railway rolling stock. Location New York City. Z-126.

DETAIL PLANT LAYOUT DRAFTSMAN with general experience, including building, piping, power plant and miscellaneous. Location New York City. Salary $200-$250. Z-127.

MECHANICAL DRAFTSMAN, experienced on designing of special machinery, tools, and fixtures. Experience should cover designing of machinery for automatic quantity production, for small interchangeable parts. In making reply please state age, nationality, married or single, experience, salary expected and how soon available. Location Connecticut. Z-128.

MECHANICAL ENGINEER between 25 and 30 years old, familiar with the design of power stations, preferably of large capacity. Excellent opportunity with this concern to any man of proper caliber. Location New York City. Z-129.

YOUNG GRADUATE MECHANICAL ENGINEER out of college a year or two, and bright enough to appreciate an opportunity when he sees it. Concern is willing to take such a man and train him in power-station design. Location New York City. Z-130.

FOUNDRY SUPERINTENDENT or general foreman on small gray-iron work. Foundry employs about 80 men. Location New York State. Z-131.

TIME AND MOTION-STUDY ENGINEER, with few years' experience for rate-setting work. Technical graduate, preferably in mechanical engineering desired. Location New York State. Z-132.

SUPERINTENDENT for reinforced-concrete factory building construction. Man with some knowledge of machinery desired. Location vicinity of Albany, New York. Z-133.

DESIGNER for crushing and concentrating machinery; must be capable of taking charge of squad. Location New York City. Z-134.

SALES ENGINEER; the largest manufacturer of certain automotive parts needs an experienced man for contact work with automobile manufacturers. Prefer college man with at least two years experience in automotive or mechanical engineering. All communications held strictly confidential. Z-20[illegible].

GROWING CONTRACTING CONCERN is badly in need of additional engineering help; men with ability, strength and pep and who can be trained to responsible positions in the organization. Experience essential in design and estimating of cost of reinforced concrete, mill buildings, or in steel and machinery layouts. State fully your experience. Headquarters New York City. Z-201.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month, and the form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

ENGINEER OR ASSISTANT MANAGER; age 44; married; technical graduate; six months in charge of reinforced concrete work; six years assistant engineer in charge of office on tunnel work and inspector of tunnel construction and damaged buildings; eight years engineer and chief draftsman in capacity of production engineer in manufacturing in connection with civil and mechanical engineering work; at present engineer in mechanical development department of glass plant. SM-5048.

MECHANICAL AND ELECTRICAL ENGINEER; graduate both departments M. I. T.; five years' successful experience research and development work in connection with pressure gages, safety valves, force-feed oilers, carburetors and general brass goods, designing for economical manufacture and efficient performance. One year's experience in charge of all equipment in modern factory employing 1000. Capable of handling entire engineering, both plant and product. SM-5049.

MASTER MECHANIC; Assistant Superintendent or Superintendent. Thorough practical mechanic; up-to-date in modern ideas, shop management, handling help, etc. Machine shop or mills; 20 years' experience. SM-5050.

COMBUSTION ENGINEER; desires position in engineering or sales department; experienced burning oil under boilers high and low pressure; installing and testing stokers burning hard and soft coal; operating boiler tests and fuel saving investigations; age 29 years; graduate M. I. T. mechanical engineering course. SM-5051.

WORKS MANAGER OR SUPERINTENDENT; age 35; college training; experience locomotives, cars, boilers, contractors equipment, foundry, general manufacturing, contract work; at present employed but seeking opening in larger field. SM-5052.

GENERAL ENGINEER; civil, mechanical and electrical, Stevens graduate, Member A.S.M.E. 19 years. Twenty-five years' experience, can design and install any kind of plant, including electrical transmission line; familiar with oil production, metallurgy and agricultural development. Willing to go to Cuba or elsewhere for commensurate salary. Minimum salary in Texas, $300 per month. SM-5053.

WORKS OR PRODUCTION ENGINEER; age 36; technical education; last four years in charge of plant layout, equipment, and maintenance in large industrial concern; also installed and operated complete production control system during 1916, 1917 and 1918. Desires connection in Philadelphia or vicinity. Employed, but available March 1. SM-5054.

ASSISTANT PRODUCTION OR EXECUTIVE ENGINEER; technical graduate in industrial engineering; age 26; over 2½ years' broad general experience as assistant engineer in large manufacturing plant; experienced in organization and production, factory routine, inspection and testing for economical use of materials and equipment. Minimum salary $2500. SM-5055.

MECHANICAL ENGINEER; Columbia graduate, age 27, seeks opportunity with efficiency or industrial engineer. Practical, progressive, economical, possessing tact, executive ability, initiative, and otherwise fitted by nature and training for efficiency work. Experience includes construction work, care and operation of electrical and mechanical equipment, and all departments of large electric-light company. SM-5056.

GRADUATE MECHANICAL ENGINEER; age 25, desires position with consulting engineering firm; has had 2 years' experience with and is at present employed by reliable boiler concern on manufacture, testing and experimental work. SM-5057.

PRODUCTION ENGINEER; graduate mechanical engineer, Columbia University, as assistant to executive of large progressive manufacturing concern located in or within commuting distance of New York City. Experience includes production, erection, testing, inspecting and research work. Minimum salary, $4000 to start. Details given in personal interview. SM-5058.

MANAGER AND ENGINEER; with broad experience in machinery development and production also in factory and general management; has satisfactorily sold his machine manufacturing business, of which he has been president and general manager for ten years. Technical graduate. SM-5059.

WORKS ENGINEER; age 28, open for engagement with progressive organization; has had exceptional exeperience on design work such as machine tools, development work, industrial layout, plant efficiency and maintenance, as designer, and as executive in charge. College education. Location immaterial. SM-5060.

MECHANICAL ENGINEER; age 24; M. E. degree; experience, one year in power-plant operation, one year as engineering officer in U. S. N.; six months with consulting engineer designing and drafting along mechanical and industrial lines; desires position with industrial or manufacturing concern in any capacity to break into production engineering. Location anywhere, preferably vicinity N. Y. C. SM-5061.

MECHANICAL ENGINEER; technical graduate 1915; age 26; experienced on interchangeable design of automobile electrical equipment and light ordnance; experimental engineer or development of small arms and ammunition, having had responsible charge of manufacture and proving of this material; desires position along executive lines, or as experimental or production engineer. Employed at present. SM-5062.

MECHANICAL ENGINEER; technical graduate. Six years' practical experience covering machine-tool design, production, and installation; marine and stationary power-plant and sugar-mill design, construction and operation. Sales and cost keeping; desires permanent connection with exporting firm in the U. S. A. English, Spanish, French, and German spoken and written; available February 15, 1920. SM-5063.

MECHANICAL AND PLANT ENGINEER; American, age 33, married; 13 years' practical experience in general plant maintenance and construction, design of machinery and buildings, factory layouts and general equipment work; special training in manufacture of brass and copper sheets, rods, tubes, wires, insulated wires and cables. Executive. A-1 references. Salary depends on position. SM-5064.

CHIEF ENGINEER AND MASTER MECHANIC; 19 years' practical experience in steam and electric-power plants, textile machinery and central stations. Lieut. Mass. 1st Engineers. Location—immaterial. SM-5065.

MECHANICAL SUPERINTENDENT; technical graduate with 11 years' experience as maintenance engineer and power superintendent. Experience with a. c. and d. c. electrical equipment; foundry, machine shop, wood working, press and textile machinery. Location—East. SM-5066.

MECHANICAL ENGINEER; who intends to visit Switzerland during months of April and May would be glad to undertake any special missions in Switzerland or neighboring states for American concerns. SM-5067.

INSTALLATION-SERVICE MANAGER; American, married, age 41, practical mechanic and graduate in mechanical engineering, now employed, desires position with larger organization which manufactures and installs machinery, preferably automatic, operating skilled erector-mechanics. Has had selling, sales engineering and works-managing experience and has specialized in organizing and operating installation service work to reduce usual heavy road expenses. Available after satisfactory notice present company. SM-5068.

PETROLEUM AND MECHANICAL ENGINEER; ten years' experience in California and Mid-Continent oil fields as chief draftsman, superintendent of construction and consulting engineer on oil-pipe lines, topping plants, gasoline plants, and refineries. Capable to take charge of designing, estimating and constructing of similar work. Executive and organizing ability. SM-5069.

MECHANICAL ENGINEER of large railroad wants change to position paying salary commensurate with his ability and experience. Has had long experience in design, testing and improvement of locomotives, cars, etc. In full charge of all designing, etc., for past ten years. SM-5070.

SALES ENGINEER, ARCHITECT: Harvard graduate; married; age 40; ten years' practicing architect and engineer Philadelphia; especially familiar with flour and grain-milling machinery and construction and mechanical work of buildings. Recent Major Infantry. Owing to loss of partner in war is available as sales engineer or executive in engineering work for which he feels himself best suited. Permanent position desired; would consider investing. Knowledge French, Italian; would go abroad, but East (New England) preferred. SM-5071.

ELECTRO-MECHANICAL DEVELOPMENT ENGINEER: Nine years' experience with induction apparatus and ignition systems, desires permanent connection; member A.I.E.E. and assoc.-member A.S.M.E. Salary about $5500. SM-5072.

SALES ENGINEER: six years' experience in selling high-grade machinery. Location immaterial. Would consider agency. SM-5073.

ENGINEER: with broad exeperience in manufacture, design and application of centrifugal hydro-extractors invites correspondence from manufacturers interested in that line. Would consider position of large responsibility only. SM-5074.

INDUSTRIAL ENGINEER; technical graduate; age 30; six years' experience designing heavy machinery, labor-saving and safety devices, power plants, piping, heating and ventilating and estimating; two and a half years of efficiency work; thoroughly familiar with planning, scheduling, routing, time study and cost accounting, neat and accurate draftsman, with present firm 2½ years, desires change. Location—immaterial. SM-5075.

MARINE CONSULTING ENGINEER: works manager, American, age 36, with 16 years' experience in shipbuilding, exceptionally qualified in ship design, construction and engineering (including Diesel oil engines, steam and gasoline engines, turbines, reduction gears, boilers, screw propellers, pumps and engine-room auxiliaries) is open for contract. Minimum salary, $7500 per annum. SM-5076.

GRADUATE MECHANICAL ENGINEER; age 25; two years' experience in shop and two and one-half years' executive experience. Now holding position in production department at Government plant. Desires position with private concern offering good opportunities for advancement. SM-5077.

CONSTRUCTION ENGINEER: 12 years' experience as designer and superintendent of construction on factory buildings. For past six years with large tractor plant in charge of construction and maintenance work. Familiar with metal and wood-working plant, paper mills, plans, specifications and superintendence of construction. Age 40; married; good health; technical education; member A.S.M.E. References furnished; salary $3600. SM-5078.

WORKS MANAGER OR ASSISTANT TO GENERAL MANAGER: 20 years' practical experience as mechanic from apprentice to executive covering manufacture of small electrical machinery and general line of small tools. Past 13 years in executive capacity; broad knowledge of office work, including organization, planning and routing, bonus plans and cost-accounting practicee. Age 37; married; location—New England; salary $5000. SM-5079.

CHIEF DRAFTSMAN OR ASSISTANT CHIEF ENGINEER: graduate in mechanical and civil engineering; age 31; married; six years in drafting room, as detailer, layer out, checker, chief draftsman and mechanical engineer. Past two years as executive and consulting engineer on airplane equipment. Expert machine designer, power units, power accessories, special and standard machinery and instruments of precision. SM-5080.

MECHANICAL ENGINEER: technical graduate 1911; experienced in power-gas producer, and plant-equipment layout, purchase, installation, and maintenance. Machine and heat-treatment furnace design. Reports on projects costs and savings. Desires maintenance or sales position. At present employed in executive work. Married. Location—Philadelphia, Wilmington, or vicinity. Salary, $3000 per annum. SM-5081.

MANAGERIAL EXECUTIVE OR PRODUCTION MANAGER: age 40; married; 15 years' experience in plant management, including production, plant engineering, plant layout, construction, maintenance, welfare and safety. Have recently completed supervision of complete design and layout of large automobile plant for high-grade automobiles now under construction; available January 1, 1920. Detroit location preferred. High-grade references furnished. SM-5082.

GRADUATE MECHANICAL AND INDUSTRIAL ENGINEER; age 35; administrative experience; plant design and construction; at present employed, available about March 1, 1920; 9 years' active experience field and office covering power and pumping plants, locks, dams, hydraulic machinery, steam and gas-engine installation; preparation of specifications and estimates; procural of engineering supplies and material. Two years in War; discharged as Capt. of engineers; suitable position or connection with large industrial or contracting firm, or office of consulting engineer desired; preferably Pacific Coast or Intermountain States; can invest limited amount in soundly-established business, or would consider commercial agency. Minimum salary $3000.00. SM-5083.

MECHANICAL SPECIALTY ENGINEER; age 30; married; 15 years' general experience in steel plants from machinist to assistant master mechanic and superintendent of department producing agricultural-machinery parts, assistant chief expediter and inspector of machinery and equipment; field and utility man for engineer in charge of 25-million-dollar improvement work. At present employed in last position, having filled it for 15 years. Minimum salary $3300.00. Can furnish best of references. SM-5084.

GRADUATE MECHANICAL ENGINEER; age 25; married; desires position with opportunity, preferably in research and experimental work. Experience before the War in experimental, also inspection and testing work with automobile manufacturers. Y. M. C. A. secretary during War, and teacher in high-school mathematics department at present. SM-5085.

MECHANICAL ENGINEER; age 45; technical graduate; with broad experience; good organizer; had charge of large forces of engineers, mechanics and necessary labor for organization in designing, constructing, equipping and operating large plants, steam, electric and hydraulic power plants; mills; machine shops; foundries; brickyards; concentrating plants; smelters; sample mills; with most modern design and machinery. SM-5086.

MECHANICAL ENGINEER: three years' experience with boilers and steam machinery; six months on marine oil-engine tests; ex-Navy engineer officer; age 24; married; wishes employment with engineering firm with opportunity for sales work, preferably in vicinity of New York City. SM-5087.

MECHANICAL ELECTRICAL SALES ENGINEER; age 39; married; eighteen years' practical engineering experience and technical training; five years' sales engineer, 13 designing, construction and maintenance of rolling mills, power plants, central station, pole-line work, by-product coke, water and general engineering works. Four years with present company as superintendent of construction and maintenance. Diversified engineering experience, proven commercial and executive ability; furnish substantiating reference. Would not

object to working abroad; minimum salary, eight thousand dollars. SM-5088.

ENGINEER; 20 years' experience with industrial-plant construction; steam-electric power installations; economy in generators and use of high and low-pressure steam, and all mechanical equipment of complete manufacturing plants. Desires responsible position with industrial firm to take charge of construction; power installation; repair; rearrangement and maintenance of plant. SM-5089.

MECHANICAL ENGINEER AND ACCOUNTANT; desires connection with "live" industrial engineering organization. Experienced in cost accounting, production, planning and scheduling estimating; construction work and executive work in manufacturing. Interested in making connection with future possibility of becoming member of firm. Age 31; married. At present employed as assistant to chief executive; minimum salary $4000. SM-5090.

EXECUTIVE ENGINEER; over ten years' experience on construction, maintenance operation; sales, and management of hydro-electric concerns, covering generation, transmission, and distribution of voltages from 110 to 60,000. Location—Chicago or Europe. SM-5091.

GENERAL SUPERINTENDENT OF PLANT; engaged on light electro-mechanical product (mass production) wishes to change; large experience as engineering executive covering precision manufacturing; medium and heavy classes of work; very successful organizing working force, handling men and equipping for manufacturing. Especially interested in propositions covering new business where management is needed. Greater N. Y. or vicinity preferred, but would go anywhere. Salary minimum $7500.00. SM-5092.

ASSISTANT FACTORY MANAGER; at present supervising mechanical engineer with well known manufacturer of material-handling machinery. Eleven years' experience in machine-shop, engineering department and factory management, Stevens graduate; age 32. SM-5093.

INDUSTRIAL ENGINEER; twelve years' experience in design, construction, maintenance and operation of manufacturing and power plants and their equipment; thoroughly familiar with most modern methods and equipment of forge, foundry, machine and assembly shops for wide variety of products; technical graduate, married, age 33, now employed. SM-5094.

MECHANICAL ENGINEER; Worcester Polytechnic Institute graduate 1915, age 28, married. Four years' experience in general engineering work in both shop and drawing room. At present employed. Desires position with opportunities for advancement to the right man. Location Eastern States. SM-5095.

MECHANICAL ENGINEER; speaks fluently French, Spanish and German. Experienced sales engineer and designer of conveying and hoisting machinery. SM-5096.

PROFESSOR OF MECHANICAL ENGINEERING; now head of a department in a state university, wants a position in an eastern or western university. Object, change of climate. SM-5097.

DREDGING SUPERINTENDENT; high-grade civil and mechanical engineer, with twenty years' practical experience in design, construction and operation of all types of dredging plant and floating equipment, desires position as superintendent or manager with dredging or marine contractor. Has successfully executed many large projects both on inland and tidal waters. SM-5098.

TECHNICAL GRADUATE, at present employed; sales and engineering experience with underfed and traveling grate stokers; familiar with general plant engineering and design; purchasing and export experience. SM-5099.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER FEBRUARY 18, 1920

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 149.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by Feb. 18, 1920, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

California

HILTON, HAROLD R., Manager, Main Street Company, Los Angeles
JARDH, WILHELM, Chief Draftsman & Designer, Akelson Machine Co., Los Angeles
ROBINSON, SAMUEL M., Fleet Engineer, Commodore U. S. Navy, U. S. S. New Mexico, San Francisco

Colorado

BAUER, FRANK S., Associate Professor Mechanical Engineering, University of Colorado, Boulder

Connecticut

BOYLAND, WALTER A., Engineer, Columbia Graphophone Co., Bridgeport
DEGENER, GUSTAVE O., Factory Superintendent, Underwood Computing Machine Co., Hartford
FRY, WINTHROP H., Chief Engineer, E. W. Carpenter Manufacturing Co., Bridgeport
GENEST, HOMER A., Designer for Lorenz & Lorenz, Hartford
HART, THOMAS G., Sales Engineer, The Terry Steam Turbine Co., Hartford
INFIORATI, MATTEO E., JR., Chief Engineer, J. N. Lapointe Co., New London
MALKOWSKI, FELIX J., Draftsman, Ashcroft Manufacturing Co., Bridgeport

Delaware

BRUBAKER, WALTER S., Engineer, Hercules Powder Co., Wilmington
DE VIGNIER, ROBERT M. Mechanical Experimental Engineer, E. I. duPont de Nemours & Co., Wilmington
MATTINGLEY, GEORGE B., Assistant Sales Manager, Edge Moor Iron Co., Edge Moor

District of Columbia

FOCARDI, PIER L., Captain, NCNY Representative, General Staff College, Washington
MUNROE, ED. K., Assistant Chief Mechanical Engineering, Hospital Section, U. S. Treasury, Washington
SCOTT, WALTER C. JR., Draftsman, Washington Navy Yard, Washington

Georgia

COOK, JAMES C., Vice President and Assistant General Manager, The J. B. McCrary Co., Atlanta
SAGO, HAMILTON R., Engineer, General Fire Extinguisher Co., Atlanta
YOPP, PAUL R., Sales Engineer, Worthington Pump & Machinery Corp., Atlanta

Illinois

BLACK, FRED E., Internal Combustion Engine Designer, Root & Vandervoort Engineering Co., Moline
CANAVAN, WILLIAM F., Vice President and Superintendent, Leader Iron Works, Decatur
MOHR, ARLINGTON G., Sales Engineer, Joseph T. Ryerson & Son, Chicago

Indiana

KING, CHARLES E., Chief Draftsman, Link Belt Co., Indianapolis

Kentucky

COVERT, HOMER L., Chief Engineer, Dow Wire & Iron Works, Louisville

Maryland

KUEHNER, ARTHUR P., Mechanical Assistant, Baltimore & Ohio R. R., Baltimore

Massachusetts

BAKER, ROBERT L., Engineer and Representative, Pierce, Butler & Pierce, Boston
DAY, RALPH R., Engineer, W. E. Tillotson Manufacturing Co., Pittsfield
ELLIS, GERSHOM P., Sales Engineer, F. A. Mazzur & Co., Boston
FAIRMAN, SEIBERT, Computer, General Electric Co., Lynn
FRANCIS, THAYER, Sales Engineer, Parks, Cramer Co., Boston
FRARY, GEORGE H., Owner and Manager, Frary Manufacturing Co., Charlemont
GREENE, CHARLES E., Mechanical Engineer, E. B. Badger & Sons Co., Boston
MARCALUS, NICHOLAS, Designing Engineer, Manning, Maxwell & Moore of N. Y. at Putnam Machine Works, Fitchburg
MARSHALL, LAWRENCE P., Research Department, Norton Co., Worcester
PEASE, GILES S., Plant Engineer, Webster St. Works, Clinton-Wright Wire Co., Worcester
PIRNIE, WARREN B., Manager, Pierce, Butler & Pierce Manufacturing Corp., Boston
SIMCOCK, JOHN H., Master Mechanic, E. B. Badger & Sons Co., Boston
WARE, CHARLES L., Engineer, Steam & Water Power Department, American Woolen Co., Lawrence
WHEATON, EGBERT A., Construction Superintendent, The Lamson Co., Boston

Michigan

COLE, RALPH A., Efficiency Engineer, Hayes Wheel Co., Jackson
GARMAN, WARREN DEW., Designer (General Design), General Motors Corp., Detroit
HALL, ALEXANDER D., Mechanical Engineer, Ford Motor Co., Detroit
HOOK, IRA T., Staff Engineer, General Motors Corp., Detroit
HOYT, HOMER J., Chief Engineer, Morgan & Wright, Detroit
LUPFER, THEOPHILUS M. R., Production Foreman, Ford Motor Co., Detroit
ROBERTSON, LESLEY C., Tool Designer, Ford Motor Co., Detroit
WILSON, CLYDE E., Professor of Mechanical Engineering, University of Michigan, Ann Arbor

Missouri

KLEE, WILLIAM A., Mechanical Engineer, Monsanto Chemical Works, St. Louis

New Hampshire

BALL, LESTER W., Marine Draftsman, U. S. Navy Yard, Portsmouth

New Jersey

HENSEL, SIEGFRIED R., Draftsman, The Babcock & Wilcox Co., Bayonne
HULETT, JOSEPH L., Engineer, Dover Boiler Works, Dover
LUDERS, RICHARD E., The Texas Co., Bayonne
McCARTHY, JOHN P., Mechanical Draftsman, George White, Jersey City
MELICK, NEAL A., Engineer of Plant, Construction & Maintenance, Submarine Boat Corp., Port Newark
PARSONS, MUNROE H., Apprentice Engineer, Babcock & Wilcox Co., Bayonne
RUFF, HERBERT, Assistant to Superintendent, N. Y. Shipbuilding Corp., Camden
SEELY, LESLIE T., Machine Draftsman, Gould & Eberhardt, Irvington
SPAULDING, FENTON J., President, Spaulding Chain Corp., Bloomfield

New York

CLINCH, Charles G., Plant Engineer, National Paper Products Co., Carthage
COOK, John W., Engineer, G. H. Lynen & Co., New York
DALTON, Howard H., Mechanical Engineer, American Sugar Refining Co., New York
DAVIS, E. W., Assistant District Engineer, Westinghouse Air Brake Co., New York
DUNCAN, Leonard R., Outside Superintendent, Morse Dry Dock & Repair Co., Brooklyn
FORD, Louis R., Engineer, Worthington Pump & Machine Corp., New York
GREENWOOD, Joseph R., Mechanical Engineer, Office of Charles G. Higgins, New York
HILDEBRAND, H. Edward, Assistant Chief Engineer, Newburgh Shipyards, Inc., Newburgh
JAEGER, Max, Designing Engineer, Anchor Cap & Closure Corp., Brooklyn
JAQUES, Russell, Raymond Concrete Pile Co., Co., New York
JONES, Spencer A., Technical Advertising, Newell-Emmett Co., New York
KINCAID, Russell McW., Works Manager, American Eveready Works of National Carbon Co., Inc., Long Island City
KRAFT, Carl, Engineer, Murphy Door Bed Co., New York
LIEBOWITZ, Benjamin, Chief Engineer, Monidyne Vehicle Suspension Co., New York
McFARLIN, Charles K., Master Mechanic, The Barrett Co., New York
MORT, William, Engineer, Singer Manufacturing Co., New York
MORTIMER, James D., President, The North American Co., New York
NAYLOR, George M., Manager Transmission Division all branches of The Fairbanks Co. New York
OLSEN, Gustav E., Sales Engineer, Fitzgibbons Boiler Co., New York
ORPIN, Francis W., New York
PRADO, Jose de J., Manager, Machinery Department, Melchior, Armstrong & Desseau, Inc., New York
RICHARDSON, Henry A., Operating Engineer, Standard Textile Products Co., New York
SCHILLING, Peter G., Sales Engineer, H. S. Johannsen, New York
SIMPSON, James A., General Machinist, New York Navy Yard, Brooklyn
SINSHEIMER, Warren A., Head of Oil Production Department, Henry L. Doherty & Co., New York
SMITH, Robert F., Mechanical Engineer, Knickerbocker Ice Co., New York
STAIGER, William, Assistant Superintendent, Rosemar Engineering Co., New York
STERNBERGER, Robert O., Mechanical Engineer, Tidewater Paper Mills Co., Brooklyn
WEAVER, Ernest W., Engineer, Surface Combustion Co., New York
WOEHRLE, Ernest A., Assistant Engineer of Tests, U. S. Navy Department, Hull Division, Navy Yard, New York

Ohio

CUTTER, Edmund I., Superintendent of Development Department, The American Laundry Machinery Co., Norwood
DRAKE, John L., Machine Designer, Defiance Machine Works, Defiance
ELSTAD, Ernest C., Special Representative for R. K. LeBlond Machine Tool Co., Cincinnati
FITZGERALD, Joseph A., Industrial Engineer, Firestone Tire & Rubber Co., Akron
HARTWICK, Louis M., Furnace Engineer, The Frazier-Sheal Co., Cleveland
HASKINS, Manly K., Safety Engineer, American Ship Building Co., Cleveland
HUNTSBERGER, Russell C., Master Mechanic, The American Rolling Mill Co., Middletown
JOHNSON, John T., Works Manager, The Portage Rubber Co., Barberton
KIEFER, Carl J., Member Reliance Engineering Co., Cincinnati
RAE, Frank B., Consulting Engineer, Cleveland

Oklahoma

PECK, Edward L., Head of Gas & Gasoline Division of Construction Department, Empire Companies, Bartlesville

Pennsylvania

AGEE, Howard H., Consulting Engineer, Dr. Thomas Conway, Jr., Allentown
BETZ, Albert C., Mechanical Draftsman, Bovaird & Seyfang Manufacturing Co., Bradford
HOWEL, William G., Technical Apprentice, Westinghouse Electric & Manufacturing Co., E. Pittsburgh
HUBBELL, Henry W., Personnel Engineer, Leeds & Northrup Co., Philadelphia
JIMERSON, Francis A., Chief Engineer, Ingersoll-Rand Co., Athens
LARSON, Lloyd E., Assistant Superintendent, Frankford Arsenal, Philadelphia
MORRIS, William C., Designer, Pittsburgh Crucible Steel Co., Pittsburgh
OPINSKY, John E., Technical Apprentice, Westinghouse Electric & Manufacturing Co., E. Pittsburgh
PANGBORN, Robert G., Sales Engineer, Alberger Pump & Condenser Co., Philadelphia
WYNKOOP, Alfred H., President & Manager, Advance Machinery Co., Philadelphia

Rhode Island

DANIELS, John H., Chief Engineer, Revere Rubber Co., Providence
RAWLINGS, Frederick G., Mechanical Engineer, Revere Rubber Co., Providence

Virginia

LEWIS, Samuel H., Inventor & Manufacturer, Richmond

West Virginia

SALISBURY, Frank W., Superintendent, Parkersburg Rig & Reel Co., Parkersburg
WALLBANK, Ernest W., Superintendent, Parkersburg Rig & Reel Co. Parkersburg

Wisconsin

BURNS, William H., Secretary & Assistant Manager, Valley Iron Works Co., Appleton
LINDSTROM, Arthur W., Mechanical Engineer, Cudahy Brothers Co., Cudahy

Canada

ARKWRIGHT, Reuben, Assistant Chief Engineer, The Eastern Car Co., Ltd., New Glasgow, N. S.
BOATE, Gerald A., Superintendent of Industrial Training, Vocational Branch Department, Soldiers' Civil Re-Enlistment, Ottawa
BUCHMAN, Louis, Assistant Superintendent, Commonwealth Chemical Corp. of Canada, Ltd., Walkeville, Ontario
HENTHORN, Arthur L., Master Mechanic Canadian Consolidated Rubber Co., Montreal
NEEDHAM, Robert J., Mechanical & Electrical Engineer, Grand Trunk Railway System, Montreal, Quebec
NEWILL, George E., Engineer in Charge of Turbine & Engine Department, Dominion Bridge Co., Ltd., Montreal
STADLER, John, Assistant Manager & Engineer, Belgo Canadian Pulp & Paper Co., Showinigan Falls, Quebec

Canal Zone

TOWER, Gilbert S., Mechanical Engineer, The Panama Canal, Mechanical Division, Department of Operation, Balboa

France

PETITJEAN, Charles P., Engineer, Ingersoll-Rand Co., Paris
WARREN, Francis W., Consulting Engineer (Paper Mill Work), Paris

Italy

GALEAZZI, Roberto, President of Soc. An. H. Gio Ansaldo & Co., Genoa

Peru

CULLEN, Charles R., Sales Representative, Baldwin Locomotive Works, Lima

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE MEMBER

Connecticut

HALLAM, Mark J., Engineer, Bridgeport Brass Co., Bridgeport

Missouri

BUFORD, Edwin H., Assistant Chief Engineer, Monsanto Chemical Works, St. Louis

New Jersey

COUCH, Frederick F., Associate Professor, Rutgers College, New Brunswick
MURPHY, John, Jr., Superintendent United Piece Dye Works, Lodi

New York

GORDON, Leo A., Chief Engineer, Fred T. Ley & Co., Inc., New York
PULLER, Otto G., Co-partner, Pull-man Engineering Service, New York
WOLLHEIM, Walter E., President & Mechanical Engineer, Alloy Foundry & Machine Corp., New Rochelle

Pennsylvania

JOHNSTON, Robert B., Superintendent Metal Division, Naval Aircraft Factory, Philadelphia
REBBEKE, Ernest A., Head, Purchase, Production, Inspection & Warehousing, U. S. S. Emergency Fleet Corp., Philadelphia
WEILER, Rudolph B., Factory Manager & Purchasing Agent, Sharples Separator Co., West Chester

PROMOTION FROM ASSOCIATE

New York

GOULD, William S., President, Fuel Engineering Co. of N. Y., New York

PROMOTION FROM JUNIOR

Connecticut

NICKERSON, John W., Industrial Engineer, Cheney Brothers, So. Manchester

Michigan

GUSTAVUS, Charles W., Engineer, Construction Department, The Detroit Edison Co., Detroit

Missouri

HOWES, Ray L., Manager Machine Department, Fairbanks, Morse & Co., St. Louis

New Jersey

JEALOUS, Arthur R., Assistant Works Superintendent, Clark Thread Co., Newark

New York

HORNE, Caleb L., Lubrication Engineer, The Texas Co., New York
NEIL, Edmund B., Assistant Truck Engineer, Pierce Arrow Motor Car Co., Buffalo
REYNOLDS, James J., Systematizing, H. L. Gantt, New York
ROSENTHAL, Emanuel, Mechanical Engineer, Sen-Jacq Film Print Co., Brooklyn
WASILKOWSKI, Felix J., Experimental Engineer, Tuttle & Bailey Manufacturing Co., Brooklyn

SUMMARY

New Applications	129
Applications for Change of Grading:	
Promotion from Associate-Member	10
Promotion from Associate	1
Promotion from Junior	9
Total	149

In Two Sections—Section Two

Volume 42 Number 3

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

MARCH 1920

A. S. M. E. Affairs

PUBLISHED MONTHLY BY THE SOCIETY
29 WEST 39TH STREET, NEW YORK, U.S.A.

Coming Section Meetings

Atlanta Section.

March 23: At the Carnegie Library Reading Room.

Subject: Ball Bearings Applied to General Power Transmission, by W. H. Holby.

Baltimore Section.

March 3: Reinforced-Concrete Design and Construction, Past and Present, by Ernest P. Goodrich, Consulting Engineer, New York City.

March 10: Railroad Grade-Crossing Elimination, by Samuel T. Wagner, Chief Engineer, Philadelphia and Reading Railroad, Philadelphia, Pa.

March 17: The Commercial Side of Engineering, by Commander Walter M. McFarland, Manager, Marine Department, Babcock & Wilcox Co., New York City.

March 24: Engineering and Construction Organization for Rapid Work, by I. W. McConnell, Vice-President, Dwight P. Robinson & Co., New York City.

March 31: (To be announced).

These lectures, which are to be given in connection with the J. E. Aldred course on engineering practice, will be held on Wednesday afternoons at 4.15 o'clock on the dates given, in the auditorium of the Civil Engineering Building of the Johns Hopkins University.

Boston Section.

March 30: Eleventh Annual Dinner of the Engineers of Boston and vicinity at the Boston City Club sponsored by the Boston Sections of the A.S.M.E., A.I.E.E., and the Boston Society of Civil Engineers. Paul Cravath, an attorney of New York, will address the gathering on Some Economic Aspects of the Treaty of Paris. Dean Roscoe C. Pound, Harvard Law School, will speak on Social Engineering. It is expected that the Presidents of the National Societies will be in attendance. All engineers and associates of engineers are cordially invited.

Cleveland Section.

March 22: In the rooms of the Cleveland Engineering Society, Hotel Statler.

Subject to be announced.

Luncheons are served daily to members and guests (ladies invited) in the dining room of the Cleveland Engineering Society, Hotel Statler.

Colorado Section.

March 26: Colorado's Development and the Engineer, by Professor L. D. Crain, State Agricultural College, Fort Collins, Colo.

New Haven Branch.

March 17: Branch Meeting at the Mason Laboratory, Yale University.

Subject: Research at the Mason Laboratory. Professor W. K. Shepherd on Properties of Materials, and Professor E. H. Lockwood on Results of Friction Tests on Pneumatic Tires, etc.

Indianapolis Section.

Every Thursday Luncheon Meeting at the Scientech Club.

New Orleans Section.

March 8: At the Louisiana Engineering Society. Subject to be announced.

New York Section.

March 9: At the Engineering Societies Building. Symposium on The Application of Heat in Industrial Processes. Speaker to be announced.

Minnesota Section.

March 1: Subject, time and place to be announced.

Philadelphia Section.

March 23: At the Philadelphia Engineers' Club.

Subject: Safeguards in Industrial Plants, by L. A. de Blois, Safety Engineer, E. I. du Pont de Nemours & Co.

St. Louis Section.

March 19: At the Hotel Statler. Joint meeting of the Associated Engineering Societies of St. Louis.

Subject: Different Processes in the Manufacture of a Heine Boiler, by F. O. Pahlmeyer, Engineer, Heine Safety Boiler Co.

Worcester Section.

March: At Worcester Polytechnic Institute.

Subject: A Trip Through the Bureau of Standards, Washington, D. C., by Dr. S. W. Stratton. Date to be announced.

San Francisco Section.

Every Thursday at the San Francisco Engineers' Club; luncheon meeting.

SOCIETY AFFAIRS

Secretary's Letter—War Service and Members' Memorial—Report of the U. E. S. for 1919—Review of Engineering Council Activities for 1919—A. S. M. E. Council in Session for Two Days—Aims and Organization Report in Effect—Necrology—Personals—Employment Bulletin—Candidates for Membership

Interdependence of Countries and Professions

The Secretary's Letter

WHAT has been accentuated by the World War is the interdependence of associations of human beings. The interdependence of nations was never so evident in the history of the world as now. There are numerous evidences of the interdependence of men in professional work, not only in the major branches of medicine, law, chemistry and engineering, but also of the many divisions of these professions.

It is to be expected, therefore, that the much-to-be-desired concerted action of all members of the engineering and its allied professions, including, I hope, the architects and chemists, will shortly be an actual fact, and you will be gratified to learn that at the Joint Meeting of the Boards of Government of the Four National Engineering Societies, the Engineering Council and the United Engineering Society, the American Society for Testing Materials being represented in Engineering Council, it was voted to approve in principle the recommendations in the report of the Joint Conference Committee and to authorize that Committee to summon immediately a conference which would be attended by representatives of all the leading national and local engineering societies. An account of this meeting is published in Section One of this issue.

Interdependence of Countries

We have our part to perform as citizens of the United States and as members of a profession are ambitious that that profession shall be eminent for good works.

When the call came from the Ministers of Public Works of France and of Devastated Regions of that country for advice in reconstruction and rehabilitation, the Engineering Societies sent their most respected and accomplished representatives. You will remember we sent our own President then in office, Mr. Charles T. Main, who offered to make the great sacrifice of absenting himself from the Annual Meeting concluding his term of office. Fortunately the steamer on which the engineering party was to sail was delayed until after the Annual Meeting. As a result of this visit, a permanent Franco-American Engineering Committee has been appointed of which, obviously, Mr. Main is a member. Our other representative is Mr. George W. Fuller, also one of the members of the group that went to France.

It has been an activity of your secretary, long before he became Secretary, to develop cordial relations with eminent engineers in other countries, and it is natural that he should continue to be interested, appreciating as he does how directly they contribute to the work of this Society and of the engineering profession.

The Secretary has been active in Pan-American Scientific Congresses and Conferences, also in the International Engineering Congress of 1915. Learning recently of the prospective visit of a large delegation from Switzerland, he has been in contact with the Minister from Switzerland, the Honorable Hans Sulzer, and is happy to report that a considerable group will visit our country and that we shall maintain the headquarters of our Society at the disposal of these friends. An official statement appears in the Council Notes in this issue.

The Secretary would be pleased to learn what members of the Society are interested in this phase of the Society's work in assisting in the general development of cultural relations, and who would join in receiving visitors from abroad and assisting them to obtain information about our country.

Such work cannot fail to harmonize differences throughout the world and help to bring about the more stable conditions which we all desire.

Calvin W. Rice,
Secretary.

St. Louis Preparing Fine Program for Spring Meeting—Reserve Dates of May 24-27

The Spring Meeting of the Society is to be held at St. Louis May 24 to 27, opening on Monday of the week of the convention and closing on Thursday. St. Louis is an ideal convention city, combining the industrial tendencies of the North with Southern hospitality, and it is adequately equipped with hotel facilities, convention halls and paints of attraction to take care of large gatherings.

It is one of the largest distributing points on the Mississippi River and as a result of the recent movement toward greater transportation facilities on the river and the construction at St. Louis of a 900-foot dock, a start has been made to make this city a port for foreign trade with water transportation, displacing to a considerable extent the more expensive transportation by rail to ports on the Atlantic Coast.

One of the first two Sections of the Society to be formed away from New York was organized in St. Louis, and the members of this Section, always interested and active in Society affairs, have long waited for an opportunity to entertain the membership. Upon announcement that the invitation to hold the next Spring Meeting at St. Louis had been accepted, a local convention committee was at once formed and the members have for some time had plans for the meeting well developed and an entertainment program outlined which is sure to attract an unusually large attendance.

Papers for the Spring Meeting should be sent to Society headquarters not later than March 15 in order to insure acceptance by the Committee on Meetings and Program and publication in advance of the meeting. Abstracts of certain of the papers are now being published in Mechanical Engineering and it is expected that the remainder will appear in the April and May numbers, together with a tentative program and other information which will be of interest to those expecting to attend the meeting.

The Dues of Members in Active Service During the War

The Council in its discretion remitted the dues of any members of the Society engaged in military or any other patriotic service in the United States.

The By-Law covering this remission specified that it should remain in effect during the continuation of the War, and for a certain period thereafter. The Council has now voted that this period should terminate on January 1, 1920, except in cases of men who remained over-seas after this date and for these men it should terminate upon their return to this country and their discharge from the Service.

Advices are that all over-seas men are now back and therefore the remission of dues to members in the Service is now virtually ended.

Society Membership in Other Organizations

At the meeting on December 5, the Council received the recommendation of the Special Committee reporting on the advisability of the Society continuing membership in the National Industrial Conference Board and making general recommendations regarding membership of the Society in any other society or organization. The report follows:

It is the unanimous opinion of your Committee that for the Council to acquire membership for the Society, in any other Society or organization, such as Chambers of Commerce, or the National Industrial Conference Board, is inadvisable, and we recommend that the Society withdraw from all such memberships.

Your Committee does not mean by this to criticize any other association or society, but believes that the dues collected from our members should be expended exclusively in activities carried on by the Society under its control.

We further recommend that if practicable to arrange for it, either through the Journal of the Society or otherwise, the results of investigations made by the National Industrial Conference Board should be made known to all our members whenever such investigations are likely to interest them.

CHAS. L. NEWCOMB,
HENRY B. SARGENT,
L. E. STROTHMAN,
W. S. RUSSELL,
FRED J. MILLER, *Chairman.*

Society of Automotive Engineers' Sections Policy

During the year 1919 the Sections Committee of the Society of Automotive Engineers decided on several changes of policy for conducting this activity which may be of interest.

The Committee secured the adoption, by the Council, of a manual for use in carrying out details of office work and procedure in meetings.

It was decided to discontinue the enrolling of associates by the sections, as it was considered better to interest young men in sections localities in Junior membership in the society. This is quite a fundamental step, as it will be recalled that the Society of Automotive Engineers has encouraged and enrolled a large number of associates who presumably will be all invited to take out membership in the Society.

To make more accurate records of the sections possible and to relieve materially the burden upon the officers of the sections, the policy has been instituted by which sections maintain a paid assistant secretary on part or whole time.

There has been considerable discussion as to the advisability of discontinuing the provision for payment of sections dues, and it has been decided that under the present circumstances these dues shall be continued.

The entire efforts are in the direction of improving the integrity for interest in the sections which are quoted as being "the life blood of the Society."

Resolutions on Death of Mr. Wellman

The special Committee consisting of Mr. Ambrose Swasey, Capt. Robert W. Hunt and Mr. Charles F. Brush, appointed by the Council to prepare resolutions upon the death of Mr. Samuel T. Wellman, Past-President of the Society, made its report at the last meeting of the Council and the following resolutions were adopted and ordered spread upon the minutes of the Society:

WHEREAS, Death has taken from us our fellow member, Samuel Thomas Wellman, and

WHEREAS, Mr. Wellman was a member of this Society for thirty-eight years, having served as its President, contributing important papers to its meetings, and taking an active interest in all its work, and

WHEREAS, He, as one of the pioneers in American steel industry, was the inventor of many important mechanical appliances and methods, and contributed as much, if not more than any other man to perfect the processes employed in the manufacture of open hearth steel, and

WHEREAS, His simple, unostentatious life and Christian character were an inspiration to those who were brought into contact with him:

Resolved, That in the death of Mr. Wellman, the Society has lost a strong and valued member; that those who knew him best have lost a firm and loyal friend; that the engineering world has lost a strong and original mind which would cope with and solve the difficult problems in the manufacture of steel;

Resolved, That Mr. Wellman's life as a man, and his career as an engineer and manufacturer, should be an inspiration to those who believe there is more to life than the mere attainment of individual success; and that it is the duty of every man to leave behind him, as did Mr. Wellman, something which has made the world better and contributed to the upbuilding of civilization.

Resolved, That these resolutions be spread upon the minutes of the Society, and that a copy be sent to the members of Mr. Wellman's family.

War Service and Members' Memorial

The American Society of Mechanical Engineers has every reason to be proud of the record of its members in doing their part to win the victory in the World War for the World's Liberty.

Besides those who served as civilians in various positions of commanding importance in the work of preparation and of supplying the needs of our own and the allied armies, some fourteen hundred members of our Society served in the military forces of the nation, over nine hundred of these as commissioned officers.

Those who know something of how a modern army is maintained in the field, will understand that members of this Society could generally render their best services behind the firing lines.

It was a full realization of this fact by those in control of our military operations that prevented most of our members from taking the part in the war that many would have preferred.

Whenever and wherever engineers were called upon for services involving danger they responded bravely and with a devotion fully equal to that of the bravest.

By special resolution at its Annual Meeting, and on recommendation of its Special Committee on War Service and Members' Memorial, consisting of Major Fred J. Miller, Chairman; Colonel J. J. Swan and Major William B. Gregory, the Society expressed its greatest appreciation of and pride in the services of its members named below who gave their lives that freedom might be preserved among the nations of the earth:

Name	*Grade of Membership in A. S. M. E.*	*Rank in United States Army or Navy*	
ANTOSCH, WALTER	Junior	Chief Machinist U. S. N. R. F.	Killed in action August 1918. Buried in Brest France
BALDWIN, CHAS. M.	Assoc-Member	Lieutenant U. S. N. R. F.	Lost at sea March, 1919
BERGES, ARTHUR H.	Junior	Sergeant 23rd Engineers	Killed in action September, 1919.
BORNHORST, A. H.	Junior	Lieutenant Aviation	Died of pneumonia December, 1918.
COOKE, STANLEY S.	Junior	U. S. Coast Grd.	Lost on S.S. *Tampa*.
CORDES, PAUL H.	Assoc-Member		Killed in action September, 1918.
CULLEN, J. W.	Assoc-Member	Lieutenant	Died in August, 1919.
DUFFY, FRANK J.	Member	Lieut-Colonel	Killed in action August, 1918
EKSTRAND, CHARLES	Member	Lieutenant, U. S. N. R. F.	Died September, 1919.
FORD, JOHN D.	Member	Rear Admiral	Died April, 1919.
GUITERAS, JULIAN	Junior	Captain, Engineers	Died of pneumonia, October, 1918.
HAYWARD, HENRY S.	Member	Lieutenant U. S. N. R. F.	Died of pneumonia, March, 1919.
HAZLEHURST, J. N.	Member	Major	Died in Brussels, February, 1919.
HORTON, ELIAS Q.	Junior	Ensign U. S. N. R. F.	Died March, 1919.
HOSKINS, STEPHEN P.	Junior	Lieutenant-Col. 319th Infantry	Killed in action in Argonne Forest.
KING, WM. R.	Member	Major, Ordnance Department	Killed at Aberdeen, Md.
LAMONT, CLARENCE B.	Member		Died March, 1918.
LYNCH, THOMAS H.	Assoc-Member	Major,. Q. M. C.	Died of pneumonia. December, 1918.
MAY, OSCAR J.	Assoc-Member	Captain, Engrs.	Died, May, 1918.
PLANK, WILLIAM J.	Junior	Cadet	Died November, 1918.
REILLY, CHARLES J.	Assoc-Member		Killed in action, September, 1918.
SEED, CHARLES R.	Assoc-Member		Died of pneumonia, October, 1918.

These members have given to the cause of humanity "all that a man hath" and have bestowed upon our Society the light of undying glory. We shall cherish and revere their memory as long as the Society continues to exist.

To the friends and relatives of these members we have lost we extend our most heartfelt sympathy, and yet ask that in their sorrow they join with us in exaltation and holy pride that it has been given to them and to us to be related by blood or by professional ties to such men as these.

Awards to Be Developed

A Standing Committee on Awards and Prizes has been authorized by the Council to develop and administer the awards of the Society, including the Junior and Student Prizes, but excepting the John Fritz Medal, which is administered by a joint board of the Founder Societies.

The Special Committee on Relations with Colleges, acting as a Committee on Awards, last year presented a valuable report to the Council, published in the October issue of Mechanical Engineering, which outlined a comprehensive scheme for the development of incentive to the members, especially the younger men, by providing for meritorious work and scholarships in engineering colleges.

Announcement will shortly be possible of an American Society of Mechanical Engineers' Medal of Merit to be awarded for notable achievement, and this will undoubtedly be followed by other awards.

The Society at present awards the Junior Prize of $50 and an Engrossed Certificate to the Junior member who presents the best paper of the year ending June 30th, and two Student Prizes of $25 each and Engrossed Certificates to those two registered members of Student Branches presenting the best papers of the year ending June 30th. Both these prizes were endowed by a prominent member. The Society also has in its gift a small sum of money donated by the late Admiral Melville, Past President of the Society, which is available for awards, and last year there was established what is known as the Charles T. Main Fund, named after Past-President Main, of $2500, part of which was money voted to Past-President Main when he was appointed to go to France two years ago and which he returned to the Society, contributing the balance to make up the sum now being held.

Report of the United Engineering Society for 1919

A brief report of the activities of United Engineering Society for the year 1919 has just been issued by the retiring president, Charles F. Rand. It includes, in addition to a general statement of the Society's work and financial condition, brief reports of the accomplishments of the Engineering Societies Library, Engineering Council, and the Engineering Foundation. A review of the Library and the Engineering Foundation's work for 1919 was published in some detail in the February issue of Mechanical Engineering (pp. 137 and 142), and elsewhere in this issue there appears a brief account of Engineering Council's accomplishments during 1919.

During the year the activities of the United Engineering Society and the Founder Societies were fully maintained, although the expenses for services and supplies were greatly increased.

The United Engineering Societies Building has been fully occupied throughout the year. The increasing requirements of the Founder Societies have made it necessary to request some of the associate societies to leave the building. Owing to increased costs it has become necessary to increase the assessments for offices and there has been established a slightly higher schedule of assessments for lecture halls.

The membership of the four Founder Societies is now 40,491, and that of the Associate Societies 22,564, a total of 63,055 engineers now having headquarters in one building.

Concerning the Engineering Societies Employment Bureau, it is reported that about 5400 men were registered during the year and about one-half of this number placed in positions, involving some 20,000 interviews and an equal number of pieces of mail. This Bureau, which was formerly connected with Engineering Council, now operates independently.

The John Fritz Medal Board of Award, composed of representatives of the four Founder Societies, awarded the medal for 1919 to General George W. Goethals for achievement as the builder of the Panama Canal. A detailed account of its presentation will be found in Mechanical Engineering for July, p. 639.

With the presentation of the report, Mr. Charles F. Rand brings to a close six years of service as President and Trustee of United Engineering Society. His administration has covered an interesting period. In this time the following events have come to pass:

The mortgage debt has been paid.

Engineering Foundation has been established.

Engineering Council has come into existence.

An Endowment Fund of $100,000 has been secured for the Library.

The American Society of Civil Engineers has become a Founder Society and has merged its library with the others.

Three additional stories have been added to the building.

The depreciation and reserve funds have been set up and now amount to $110,199.00.

The assets, which were $1,687,808.48, with a mortgage indebtedness of $88,000.00, have now become $2,468,395.37, a gain of $868,586.89.

A Review of Engineering Council Activities for 1919

During the year just past the activities of Engineering Council have been presented in considerable detail in the columns of Mechanical Engineering. It is thought, however, that a brief summary of the Council's activities might be of interest and the following, based upon the chairman's report for the year, has accordingly been prepared.

A Washington Office with M. O. Leighton in charge was opened Jan. 1, 1919.

In February the American Society for Testing Materials completed qualifications as the fifth member society, and has since taken an active part in Council's work.

In April, Engineering Council called together in Chicago, representatives of seventy-four technical organizations having 105,000 members, to discuss an effort to secure a National Department of Public Works. To conduct and finance this movement, there was created a body now known as the National Public Works Department Association.

In September, Engineering Council became a member of the Chamber of Commerce, U. S. A.

A Committee on Classification and Compensation of Engineers, created in March, worked in three sections dealing with engineers in the employment of (1) Federal Government, (2) Railways, (3) Cities and States. In January, 1920, the committee issued its final report.

To expedite completion of topographical maps of the United States, President Wilson, in response to a communication from Engineering Council, by executive order, constituted a Board of Surveys and Maps, of one representative each from the fourteen map-making agencies of the Government, and invited representatives of Engineering Council and engineering and scientific societies to coöperate. The new board set up a permanent organization January 13, 1920.

The Committee on Licensing Engineers, after fourteen months' work, presented in December a valuable report accompanied by a "Recommended Uniform Registration Law, to regulate the practice of professional engineering, architecture and land surveying."

The Fuel Conservation Committee continued coöperation with the Government, and recommended support of a Federal appropriation for a survey to determine the desirability of a superpower system in the industrial region extending from Boston to Washington.

The Water Conservation Committee appointed correspondents in twenty-seven states, is seeking correspondents in other states, is collecting useful information, and is aiding the Maine Water Power Commission on questions of policy in response to a request from its chief engineer.

By public hearing, in January 1919, Engineering Council aided the reinstatement of 350 engineers unfairly dismissed by the City of New York. It also assisted late in the year in securing better salaries for these and other engineers and in preventing a recurrence of last year's unfortunate conditions.

Council took part in organizing a National Board for Jurisdictional Awards in the Building Industries, and has a member thereon.

Council also appointed three representatives to coöperate with equal numbers from the American Institute of Architects and the Associated General Contractors of America, to determine a policy regarding "Payment for Estimating."

Late in 1919, and in January 1920, committees were appointed on Types of Government Contracts, on Military Affairs, on Coöperation with the American Institute of Architects, and on coöperation with Association of Russian Engineers in America.

Council gave much assistance to the War Department Claims Board in securing technical experts to review reports on claims amounting to approximately two billion dollars.

A.S.M.E. Council in Session Two Days

First-Day Conference with Other Societies' Boards—Engineering Organization Discussed and Important Decision Reached—On Second Day Council Completes Lengthy Agenda—Adopts Aims and Organization Report

The Council was in session for two days in the month of January, the 23d and 24th. On the first day it met jointly with the governing boards of the other Founder Societies, the Trustees of the United Engineering Society and the members of the Joint Conference Committee of the Founder Societies, at the call of Engineering Council. On the evening of the first day and the whole of the second day the Council was in regular session.

The purpose of the joint meeting was to consider the broad question of organization of the engineering profession, and the basis of the discussion was the report of the Joint Conference Committee which was abstracted in the January issue of Mechanical Engineering, having been discussed at our Annual Meeting and under discussion by the meetings of the other societies.

The joint meeting resulted in the adoption of this report and the passage of a resolution requesting the Joint Conference Committee to call without delay a conference of representatives of national, local, state and regional organizations to bring into existence a comprehensive organization of all the societies in this country.

At the same time actions were taken to strengthen the organization of Engineering Council and provide financial support for it for the time being. The work done by the National Public Works Department Association was also approved.

Our own Council commenced its regular January meeting in the evening and the following were present: President Fred J. Miller; Vice-Presidents Fred R. Low, Henry B. Sargent, John A. Stevens, John R. Allen, Robert H. Fernald; Past-Presidents D. S. Jacobus, I. N. Hollis, Charles T. Main, M. E. Cooley; Managers D. Robert Yarnall, Charles L. Newcomb, C. Russ Richards, Frank O. Wells, E. C. Fisher, E. F. Scott; Chairmen of Standing Committees, *Finance*, George N. Forrest; *Publications*, George A. Orrok; *Local Sections*, E. S. Carman; *Secretary*, Calvin W. Rice, and by invitation, A. M. Greene, Jr., E. B. Katte and L. P. Alford. The meeting adjourned from the evening session and continued all the following day.

Probably the most significant action taken was the adoption of the reports of the Committee on Aims and Organization and of the Joint Conference Committee of the Founder Societies. The features of the former were referred to the appropriate committees of the Society, with a request that they report back to the Council on the several recommendations. The adoption of the second report carried the authorization of the Society's representatives, Mr. L. C. Marburg, Prof. D. S. Kimball, Prof. L. P. Breckenridge and Mr. E. S. Carman, to take the necessary steps in conjunction with the representatives of the other societies to carry out the recommendations of the report.

The thanks of the Society are due to all those members representing the local sections who participated in the preparation of the report of the Committee on Aims and Organization, a service which extended over a period of 16 months, and also to our representatives on the Joint Conference Committee.

Executive Committee. The Council chose Fred J. Miller, Chairman, Robert H. Fernald, Ira N. Hollis, D. S. Jacobus, Charles T. Main and Henry B. Sargent as its Executive Committee for 1920.

Visits of Foreign Engineers. The President was authorized to appoint committees to assist in receiving engineers from foreign countries visiting the United States. He announced that, through the Swiss Ministry, he had formally invited a Swiss Commission of Engineers and Economists to take part in our Spring Meeting at St. Louis.

Finance Committee. Because of the absence of the Treasurer on account of his health, the President was authorized to act for him in all matters, and notice was given on Amendment to the By-Laws to this effect.

Meetings and Program Committee. H. P. Fairfield, Fred E. Rogers and George E. Merryweather, were approved as additional members of the Subcommittee on Machine Shop Practice.

Membership Committee. The death of our Honorary Member, M. Anatole Mallet, was announced and suitable resolutions ordered prepared.

Local Sections Committee. On the recommendation of Mr. E. S. Carman, Chairman, the Cleveland plan of joint membership of the Cleveland Engineering Society and this Society was extended for one year.

An invitation to the Council from the Western Society of Engineers to meet in Chicago in April was accepted, as was also an invitation from the Baltimore Section to the Council to hold its February Meeting in that city on February 28.

Two slight amendments to By-Law B-49 governing Local Sections were presented. One was to change the term "Local Members," meaning non-members of the Society associated with Sections, to "Affiliates."

On the recommendation of this Committee a petition from the members in Pittsburgh for the establishment of a Section there was granted. The territory will include all towns within a thirty-mile radius.

Formal exchange of courtesies with the Engineers' Club of St. Louis was approved.

Nominating Committee. The following amendment to the By-Laws legalizing the Nominating Committee for 1920 was approved. "The nomination of the members of the Nominating Committee for the year 1920, made by the delegates of the local sections at their session commencing December 2, 1919, shall if unrevoked be a sufficient nomination of such committee by said delegates within the intendment of these By-Laws."

Further amendments to the By-Laws on the manner of selecting the Nominating Committee after 1920 and on the procedure of all Nominating Committees were presented for first reading. As soon as adopted, these amendments will be published in full in Mechanical Engineering.

Standardization Committee. The Council approved and accepted sponsorship from the American Engineering Standards Committee on the four following committees: (*a*) Standardization of Spur, Bevel, Worm and Sprocket Gears, which is to be a joint committee with the American Gear Manufacturers Association; (*b*) Standardization of Ball Bearings, which is to be a joint committee with the Society of Automotive Engineers; (*c*) Standardization of Machine Tools, which is to be a joint Committee with the National Tool Builders Association; (*d*) Standardization of Cylindrical Limit Gages for General Engineering Work, and appointments on these committees were referred to the President with power.

Shafting Committee. The report of the Committee on Standardization of Sizes of Shafting was accepted and ordered printed, and the committee's request granted that it be allowed to reorganize with the approval of the President.

Boiler Code Committee. Interpretations Nos. 262 to 269 inclusive and 271 and 272 were approved and ordered printed as usual.

The revisions of the preliminary report on Boilers for Loco-

motives not subject to Federal Inspection or Control was approved.

A. M. Greene, Jr., Chairman, Wm. H. Boehm, E. R. Fish, Walter S. Finlay, Elbert C. Fisher, H. M. Hauser, D. S. Jacobus, M. W. Kellog, Wm. F. Kiesel, Jr., I. E. Moultrop, F. N. Speller, John A. Stevens, Chas. Van Stone, and James Aston, were approved as a Subcommittee on Specifications for Steam Piping.

The request of the Boiler Code Committee for permission to appoint a committee to confer with the American Welding Society on Rules in the Boiler Code concerning welding was adopted.

Relations with Colleges. A Rule was formulated to limit the establishment of Student Branches to those institutions giving a full four-year course in engineering and meeting the requirements of the Carnegie Foundation and being Class A colleges.

Committee on Awards. A Standing Committee on Awards and Prizes, to develop and administer the awards of the Society, including the Junior and Student prizes but excepting the John Fritz Medal, was authorized.

Committee on Committees. The report of this Committee, including important recommendations on the committee work of the Society, was adopted.

Professional Sections. The report of the Advisory Committee on Professional Sections, recommending procedure and also recommending the establishment of sections on Aeronautics, Cement, Fuel, Gas Power, Industrial Engineering, Machine Shop, Power, Railroads and Textiles, was adopted. An account of this new activity is published elsewhere in this issue.

Appointments. Ambrose Swasey, Robert W. Hunt, Charles F. Brush, were approved as a Memorial Committee to the late Mr. Samuel T. Wellman. Its resolutions are published elsewhere in this issue.

Frank T. Chapman was appointed to represent the Society at a Conference of the Society on Industrial Engineers' Committee on Elimination of Industrial Fatigue.

John R. Freeman and Jesse M. Smith were appointed Honorary Vice-Presidents to represent the Society at the inaugural meeting of the Indian Society of Engineers, at Calcutta, India.

L. P. Alford was appointed the Society's representative on Engineering Council to fill the vacancy caused by the resignation of George J. Foran, to whom a special letter of appreciation was ordered sent.

American Engineering Standards Committee. The admission of the National Safety Council, the National Fire Protection Association, the National Board of Fire Underwriters and the Associated Factory Mutual Fire Insurance Companies, as members of the American Engineering Standards Committee was approved.

Birthday of Mr. Edison. The Secretary was requested to send a message of congratulations to Mr. Thomas A. Edison, Honorary Member of this Society, on the occasion of his 73rd birthday, February 11th.

CALVIN W. RICE,
Secretary.

Aims and Organization Report in Effect

Sixteen Months' Work of Special Committee on Policy Satisfactorily Completed by Council Adopting Report in Toto

The report of the Special Committee on Aims and Organization appointed in the Fall of 1918 to study matters of policy and organization of the Society was approved and adopted by the Council at its January meeting, and a resolution was passed referring those recommendations in the report which applied to existing activities to the Committees in charge of them, with a request that these Committees report back to the Council on the recommendations concerning their work.

The virtual significance of this action is that representatives of the Local Sections of the Society have succeeded in placing in the hands of the Society's committees instructions regarding the scope and direction of the Society's work.

The report of this Committee on Aims and Organization was originally published in MECHANICAL ENGINEERING last July, together with discussion by the members of the Society assembled at the Spring Meeting in Detroit last June. The report was again discussed by the Society at the Annual Meeting in December last, prior to its final passage by the Council.

Drawing their conclusions regarding the final action from the two general discussions by the members of the recommendations of the report and from the sympathetic attitude of the Council regarding the recommendations, the Standing Committees of the Society have not been slow to sense the spirit behind this movement and have had the policies recommended under discussion for many months with the result that the final action turning the recommendations over to them, finds them ready to proceed. The extent to which the Committees have fallen into line may be judged from the following brief synopsis of the status of the several recommendations of the Aims and Organization Committee.

Adoption of Standards. Constitutional amendment to provide for approval and adoption of standards now being balloted on and will go into effect at Spring Meeting in May, if ballot is favorable. Therefore a year has been saved on this recommendation.

Professional Features of General Meetings. These recommendations concern tenure of office of Sub-committees on Meetings Committee and have been considered by the Special Committee on Committees, as announced in Council Notes in the January issue, page IV.

Research and Standardization. These recommendations have been referred to the Standing Committees on Research and on Standardization, respectively.

Those who have followed the department of Engineering Research conducted in MECHANICAL ENGINEERING during the past year by the Research Committee, will sense the development of this Committee's work in accordance with the new recommendation.

The question of standards has to be worked out now in connection with the American Engineering Standards Committee.

Industrial Engineering. Recommended that this be made a major subject. This recommendation is now receiving the earnest consideration of a special committee which is expected to report to the Council within two months.

Education and Special Training. Placed in the hands of the Committee on Relations with Colleges.

Professional Sections. See important announcement on this activity in this issue of MECHANICAL ENGINEERING. No time has been lost in acting on this recommendation.

"*Mechanical Engineering.*" The Committee on Publication and Papers has been allowed money from the Society's reserve account to develop MECHANICAL ENGINEERING and has been working along the lines recommended.

Transactions. The Committee on Publication and Papers has had the matter under consideration for some months, although it has not yet discovered a substitute for Transactions.

Hand Book on Mechanical Engineering Data. This is also under consideration, although prohibitive printing costs have discouraged immediate consideration of launching this activity.

Engineering Societies Employment Office. The Engineering Societies Employment Bureau has been expanded to the limit of available appropriations.

Code of Ethics. Special Committee on this subject to report at the forthcoming Spring Meeting.

Regular Nominating Committee. The Committee for 1920 was elected by the Local Sections at the Annual Meeting in full accord with the spirit of this recommendation, and elaborate By-Laws are now in passage through the Council to establish the method of election recommended.

Time of Election of Officers. The By-Laws in passage regarding the nominating Committee provide for advancing the time of election of officers to October 1, which will give the President ample opportunity to appoint Committees before the Annual Meeting.

Information on Candidates. Biographical sketches of all candidates were issued to the membership with the last ballot.

National Organization. The recommendations on creating a national agency through which coöperation of all local groups, state groups and national societies can be secured for purposes of national scope have been expanded in a memorable report by the Joint Conference Committee of the Founder Societies which is about to be put in effect, as noted elsewhere in this issue.

The thanks of the Society are due to the group of members who constituted the Committee on Aims and Organization and who worked for sixteen months on one of the biggest problems the Society has ever undertaken—that of conducting a thorough investigation into its own affairs. That the recommendations of this Committee are far-reaching will not be disputed, but that is not the essential point, which is that the members of this com-

mittee individually and the Society collectively have a satisfaction of knowing that, in the memorable year 1919, the period of self-examination of the major engineering organizations, our Society not only maintained but considerably enhanced its prestige and also assisted in maintaining and enhancing the prestige of the Founder Societies' movement, which is evidenced in the growing acceptance of the vital recommendation of the Joint Conference Committees of the Founder Societies that there be a single comprehensive organization in the engineering profession to further the public welfare wherever technical knowledge and training are involved.

A New Activity—Professional Sections

Groups to Be Formed of Members Having Common Specialties—Aeronautics, Cement, Fuels, Gas Power, Industrial Engineering, Machine Shop, Ordnance, Power, Railroads, Textiles, Proposed as First Sections

Under the authority of the Constitution the Council has authorized the establishment of Professional Sections, and steps are being taken to inaugurate sections on Aeronautics, Cement, Fuels, Gas Power, Industrial Engineering, Machine Shop, Ordnance, Power, Railroads and Textiles. These first sections will be the nucleus of an organization of Professional Sections covering all branches of mechanical engineering, and other sections will be established as quickly as interested groups in the Society make application. An amendment to the Constitution to create a standing Committee on Professional Sections is now being balloted on.

The Local Sections provide for groups of members having a common interest—their community activities. The Professional Sections will provide for groups of members having a common interest—their specialty.

Members Will Be Registered

To inaugurate the new activity, registers will be prepared of all members of the Society specializing or interested in each of the ten branches listed above. Members of all grades, without regard to residence, may have their names entered in these registers upon application and all members interested are invited to make application immediately. *There will be no additional assessment on members for participation in this activity.*

As soon as the registers are made up, ballots will be taken in each Professional Section to elect an Executive Committee in accordance with By-Laws already established and reprinted below. It is to be noted that these By-Laws also provide for Affiliates of the Sections, and members are invited to suggest the names of non-members who may be interested.

By-Laws Governing Professional Sections

These By-Laws were originally passed by the Council at the time the By-Laws governing Local Sections were put into effect; in fact, the two sets of By-Laws were framed by the same committee. The Council sees no reason to modify them at this time, but a special committee on Professional Sections which was recently appointed by the Council to advise on this activity suggests a slight amendment which is here given as a footnote.

B 47 (*a*) A professional section of the Society shall consist of Honorary Members, Members, Associates, Associate-Members and Juniors of The American Society of Mechanical Engineers and of other persons to be designated Affiliates as hereinafter described.

(*b*) A professional section of The American Society of Mechanical Engineers may, with the approval of the Council, be organized for the consideration of any engineering, scientific, or professional topic, provided that a number, satisfactory to the Council, of Members of the American Society of Mechanical Enginerrs, unite in making written request for such an organization. Such a section shall be designated as ——— Section of The American Society of Mechanical Engineers,—the blank being filled by the topic specialized.

(*c*) The provisions of the Constitution, By-Laws and Rules of The American Society of Mechanical Engineers, and the precedents of the Society with respect to professional sessions for the discussion of papers, shall cover the procedure of the professional sections except that no meeting of a section shall be considered a meeting of the Society as a whole.

(*d*) For the convenient conduct of its professional affairs the section shall organize an Executive Committee of five members of the Society, under the general direction of the Council. Such officers as the section shall require must be selected from the membership of the Society. Other committees of the section shall be appointed by its Executive Committee.

(*e*) The Executive Committee of the section subject to the approval of the Secretary of the Society, shall designate a Secretary of the section of the Society whose duties shall be those usually attaching to the Secretary of a professional section, and who shall also see that the discussions of papers are satisfactorily reported and transmitted to the Secretary of the Society.

(*f*) Expenditures for the purpose of a section chargeable to the Society must be authorized by the Secretary of the Society before they are incurred, and must be provided for in the budget approved by the Council. No liability otherwise incurred shall be binding on the Society. Any expenditure not so provided must be met by the section itself.

(*g*) Engineers and others not members of The American Society of Mechanical Engineers, but desiring to participate in the meetings of the section may enroll themselves as Affiliates as heretofore provided, with the approval of the Executive Committee of the section. Such Affiliates shall have the privilege of presenting papers and taking part in the discussions. They shall pay five dollars ($5) per annum, which shall be due and payable in advance on October 1 of each year of their enrollment, and shall thereby be entitled to receive the regular issues of The Journal for a period covered by such subscription.

(*h*) The Council of The American Society of Mechanical Engineers may, at sixty days' notice, suspend or disband any section.

NOTE: A proposal to amend these By-Laws is before the Council. This provides that the dues of Affiliate members of the sections not members of the Society be $10 instead of $5. Until this amendment is decided, names of Affiliates suggested will merely be kept on file and these men will not be approached for registration.

Suggested Activities of Professional Sections

The primary object of these sections is to strengthen the professional activities of the Society by developing group action of specialists within the organization for the purpose of developing their fields and of keeping the whole Society informed regarding progress in their specialties. This can and should be done in coöperation with the other activities of the Society as follows:

In Connection with the General Meetings. At the request of the Committee on Meetings and Program to provide papers and conduct symposiums on special subjects at the Annual and Spring Conventions.

In Connection with the Local Sections. At the request of the Committee on Local Sections and of the Executive Committees of the several Local Sections throughout the country, to provide papers for meetings and conduct symposiums at meetings of the Local Sections.

In Connection with Special Meetings. At the instigation of the Professional Sections themselves, to conduct special meetings of the Society as directed by the Council in accordance with the Constitution.

In Connection with the Publications. To provide papers for MECHANICAL ENGINEERING, as do the Local Sections, subject to the approval of the Committee on Publication and Papers.

In Connection with Other Activities. The work of the Research and Standardization Committees and all the various professional committees of the Society will be closely allied with the new activity.

In Connection with Other Organizations. To coöperate with special organizations and with similar professional sections of other societies in the advancement of engineering knowledge and development of the goodwill of the engineering profession.

How to Register in the New Activity

Members desirous of actively participating in the work of the new Professional Sections should request the Secretary to enter their names in the registers, specifying in which section or sections they wish to be enrolled.

Members are also invited to suggest additional professional sections to those listed in the first paragraph.

To facilitate the election of committees, members are also invited to indicate their availability for committee work in the Professional Sections.

Finally, names of non-members who are likely to be interested in the new activity will be received by the Secretary and placed on file to be later considered for registration as Affiliates.

Should A.S.M.E. Juniors Have the Privileges of Members?

The Philadelphia Section Says They Should and M. L. Cooke Gives the Reasons Why

At the meeting of the Philadelphia Section of the A.S.M.E., held January 27, resolutions were passed asking such changes in the Constitution of the Society as would be necessary to give Juniors the right to vote and hold office. It is at present provided by the Constitution that only the upper grades of membership shall be permitted to vote and hold office, although Juniors share with the other members all the other privileges that go with membership in the Society. The text of the resolutions is as follows:

WHEREAS, Under clauses C6 and C7 of the Constitution of The American Society of Mechanical Engineers Junior members are prohibited both from voting and from holding office; and

WHEREAS, Such reasons as may have suggested the wisdom of this provision at the time of its adoption over 30 years ago no longer obtain; and

WHEREAS, The withholding of these vital privileges from members below 30 years of age is out of harmony with the practice of other professions and the institution of organized society generally; and

WHEREAS, It is desirable to encourage our younger members to the fullest possible participation in Society affairs; now therefore be it

Resolved, That the Philadelphia Section of the A. S. M. E. go on record as favoring a change in the Constitution which will permit Junior members both to vote and to hold office; and further be it

Resolved, That the Secretary be instructed to transmit a copy of these resolutions to the Council and to each Section of the Society requesting the coöperation of these bodies in securing the adoption of the necessary amendments in the Constitution.

At the meeting of the Section at which these resolutions were introduced remarks were made by Morris L. Cooke outlining very fully the reasons for adopting the resolutions advocating the extention of full privileges to all Juniors in good standing. Mr. Cooke said:

The members of the Section will doubtless be more interested in the present-day value of the provisions which prohibit Juniors from voting and holding office than in the reasons which operated nearly a generation ago to have these provisions included in the Constitution.

After a somewhat careful investigation I can find only one instance outside of engineering where a man after he has reached the age of 21 is barred from full participation in the activities of organizations to which he is otherwise eligible. The single exception is a rule of the Supreme Court of the United States which provides that a lawyer must be 30 years of age before he is eligible to practice before it. The reason for such a rule is obvious. Of course in all relations with the Government in city, state and nation, a man secures all his privileges and has thrust upon him his full responsibilities when he reaches the age of 21. The same is true in all social organizations the constitutions of which I have been able to examine. In church affairs full obligations are assumed and full privileges are granted frequently even before the member has reached the 21st year. Here age as such does not appear to be a controlling factor. In all the professions except engineering—medicine, the law and architecture, for instance—I have not been able to discover any place—except the single instance of the Supreme Court noted above—where any age except 21 is stipulated as a requirement for full participation.

Even in engineering the practice is not by any means uniform. In fact, the practice of withholding the vote and the right to hold office from any class of members, even in engineering organizations, is quite unusual. The "Miners" allow all members irrespective of age or grade both to vote and hold office. The "Electricals" allow all classes to vote but do make a provision that only fellows who are over 32 years of age may be president and that only members who are over 27 years of age shall be vice-president, manager or treasurer. The Associates, who seem to correspond to our Juniors, however, can vote but not hold office. With the "Civils" only the two higher grades of the membership —Members and Associate-Members—vote and held office. The Associates and the Juniors do neither. But in this connection it should be noted that Juniors are admitted at 18 and automatically cease to be members at 32 in case before that time they have not secured some other grade of membership. The Franklin Institute has associates between 17 and 25 who neither vote nor hold office. But at 25 they automatically pass to a different basis as to dues and then secure the full privileges of membership without any further test as to eligibility. Apparently the only reason for withholding the vote is the fact that they pay very low dues. There are a large number of engineering and quasi-engineering societies, however, which make no exception in this matter of voting and holding office in favor of any class of the membership.

In view of the foregoing it is probably a fair statement that in admitting Junior members at 21 and then not allowing them to vote or hold office until they become Associate-Members at 27, Associates at 30 or Members at 32, the A. S. M. E. observes the most conservative policy in this respect of any organization in the United States.

The last Year Book of the A. S. M. E. lists nearly 8000 (7914) members of the grade which can vote and hold office and nearly 2300 (2275) in the Junior grade. So that if we gave Juniors the vote they would have something less than a quarter of the total. Inasmuch as very few men join the Society just at 21 and there is nothing to force Juniors to change grade at 27, 30 or 32—the ages at which they become eligible to other grades—it is likely that the average age of Juniors is much above what it would appear to be.

Undoubtedly many young engineers postpone joining the A. S. M. E. until they can do so on a basis which will give them full privileges. Due to this postponement probably some men never join. Of even more importance is the fact that Junior members without the right to vote and hold office are loath to take any active part in Society affairs. This habit of being onlookers is one not easily overcome. There are of course certain kinds of Society work which are entirely appropriate and even desirable for men below 30 which may be inappropriate and even burdensome for engineers who have begun to take on the more responsible grades of work. It also seems to me that we need in all our activities more of the viewpoint and enthusiasm of the younger men. Experience shows that when it comes to selecting officers the young man is just as apt to want the best man as are his seniors and is not influenced to vote for a young man simply because of his youth.

Finally, as I pointed out in a communication published in the November issue of MECHANICAL ENGINEERING, it seems to be very bad taste—if nothing more—to refuse to allow Juniors full participation in Society affairs in view of the fact that we have our fighting and dying done for us now by men below 30. It will be recalled that the A. E. F. regiments chosen by the selective draft were confined to the 21-30-year-olds. I do not think The American Society of Mechanical Engineers can afford to continue this archaic and useless custom of withholding valued privileges from its younger members.

Some time ago there was sent out to the members of the Society, known to have served in either a military or civilian capacity during the war, a questionnaire. This was sent out by a committee which had been appointed to collect information and to supervise the publication of a record of members who served in such capacities.

The response to the questions asked has not been what it should have been—very many have failed to answer. The committee hopes that all who have not done so will immediately reply to the questions that were asked, in order that the Society's publication may be complete.

NECROLOGY

LUCAS NICOLAAS ALTA

Lucas Nicolaas Alta, a member of the Society since 1896, died at Watergraafsmeer, Holland, December 2, 1919. Mr. Alta was born in Holland in 1859 and received his education at the School of Technology, Amsterdam. Following his graduation, he obtained drawing-room and shop experience in Amsterdam and was for a time assistant engineer on board a steamship. From 1882 to 1896 he was connected with the W. C. & K. DeWitt Engineering Works in Holland as chief erector and draftsman. From 1896 until the time of his death he was mechanical engineer and a member of the firm of L. N. Alta & Co., of Amsterdam.

DANIEL ASHWORTH

Daniel Ashworth, who died November 8, 1919, was born in Lancashire, England, in 1841. At the age of nine he came to this country with his father, settling in Pittsburgh, Pa., where he attended the public schools. He entered the mechanical field as a glass mold maker and later became master mechanic of glass works in Pittsburgh and Boston. In 1872 he became the manager of the Hemingray Glass Company, Covington, Ky., a position which he held for ten years, during which time he made a thorough study of steam. For several years he was general superintendent of the Lane & Bodley Co. of Cincinnati. In 1885 he returned to Pittsburgh as consulting engineer and steam expert.

Mr. Ashworth retired from the engineering profession in 1906, having been honored by President Roosevelt with the appointment as United States Pension Agent of Pennsylvania; later he was reappointed by President Taft. He became a life member of the Society in 1885. He was also a member of the Engineers Society of Western Pennsylvania and was prominent in fraternal, civic and political affairs throughout western Pennsylvania.

EVARTS SHANKIN BARNUM

Evarts S. Barnum, of the C. M. Basford Co., died at his home in Ridgewood, N. J., on February 3, 1920. Mr. Barnum was born in Louisville, Ky., in July, 1883. He was educated at Purdue University, being graduated in 1906. His entire business life was connected with railroad work. Immediately upon his graduation from college he entered the service of the Pennsylvania Lines West as apprentice, and worked successively as apprentice, machinist, foreman, general foreman, roundhouse foreman and motive-power inspector. Leaving the railroad in 1917 he joined the staff of the *Railway Age* as associate editor, later becoming associated with the C. M. Basford Co. in charge of the copy department.

Mr. Barnum became a member of the Society in 1918.

HENRY B. BARTLETT

Henry B. Bartlett, consulting engineer for B. F. Perkins & Sons, Holyoke, Mass., died on January 18, 1920, of pneumonia. Mr. Bartlett was born in December 1856 in Carbondale, Pa. He began his mechanical experience at the old locomotive works in Paterson, N. J., in 1872 and completed his work at the Farrel Foundry & Machine Co., Waterbury, Conn. Since that time Mr. Bartlett was connected with some of the largest machine interests of the country as mechanical expert and engineer, including the Mergenthaler Linotype Co., which was brought to a manufacturing basis largely through his inventions and skill.

In 1896 Mr. Bartlett went to Berlin, Germany, as general manager of the Ludwig Loewe Co., and while there became advisory engineer to the Typograph Gesellshaft. In 1902 he returned to the United States, becoming a teacher of tool and machine making at the Hebrew Technical School, New York. He held this position for eleven years when he resigned to become associated with B. F. Perkins & Sons.

Mr. Bartlett was a member of the Engineering Society of Western Massachusetts. He became a member of our Society in 1918.

HENRY DONALD KEMP

Henry Donald Kemp died at Montreal, Canada, on October 4, 1919. He was born in Boston, Mass., in October 1890, and was graduated from the Massachusetts Institute of Technology in 1912 with the degree of B. S. in electrical engineering. For several years he was in Rio de Janeiro, Brazil, first as assistant to the engineer in charge of the construction of a coal-handling plant and later in charge of the erection of a half-million dollar coal pier. His connection at this time was with the Mead-Morrison Manufacturing Co. and following his return from Brazil he was assistant engineer of the foreign department of this concern.

During the war he was engaged in the production of munitions. He was superintendent of the British Munitions Company, Ltd., near Montreal, Canada, and in charge of all work of the concern, the only American among 4,000 Canadians. Following an unsuccessful attempt to enter active sevice, he accepted the position of assistant works manager of the National Conduit & Cable Co., an ordnance concern, at Hastings-on-the-Hudson, N. Y. Later he returned to Montreal and reengaged in production work in munitions supplies. At the time of his death he was about to enter the firm of Howard Smith Paper Co., Ltd., as assistant to the president.

Mr. Kemp was a member of the Technology Club of New York, of the American Institute of Electrical Engineers, and a junior member of the Society since 1916.

MATTHEW LEANDER KING

Matthew Leander King, Major, U. S. A., died on October 23, 1919. Major King was born in Panora, Ill., on May 20, 1878. He was graduated from the mechanical engineering department of Iowa State College in 1906.

He spent five years as an experimentalist in agricultural engineering with the Experiment Station of Iowa State College, Ames, Iowa, during which time he invented the hollow clay tile silo. For two years he was superintendent and general manager of the David M. Bradley Implement Works at Bradley, Illinois. He organized the Iowa City manufacturers into the Permanent Buildings Society for the development of new designs of and uses for hollow-clay building tile.

Mr. King entered the army in September, 1917, with the rank of Captain and was assigned to the Aviation School of Aerial Observation at Post Field, Fort Sill, Okla., in charge of maintenance and repair of aeroplanes. He was advanced to the rank of Major in August, 1918, and in November of that year was assigned to Indianapolis as chief engineering officer for aviation in the Northern District. In February, 1919, he was made acting director of aviation for the Northern District. In April he was transferred to Washington, D. C., and from there he was assigned on special missions until July when he became fight commander and chief engineering officer of the All-American Pathfinding and Recruiting Expedition. He was transferred from the Officers' Reserve Corps to the regular army with the rank of Major in October about a week before his death. While at Post Field he learned to fly and was given the classification of Reserve Military Aviator.

Major King was a charter member of the American Society of Agricultural Engineers, a member of the American Society for Testing Materials, and belonged to various aeronautical and officers' clubs. He became a member of our Society in 1912.

HENRY WEICKEL

Henry Weickel, who died on November 28, 1919, was born in Germany on October 31, 1852. He was graduated from the Technical Institute at Kaiserslantern, Bavaria, and came to the United States shortly afterward, in 1872.

He entered the employ of the Government as a draftsman at the Watertown Arsenal, Mass., and remained there five years when he became connected with the Hinckley Locomotive Works, Boston, in a similar capacity. In 1882 he accepted a position with the Yale & Towne Manufacturing Co., Stamford, Conn., as a designer of cranes and hoisting machinery, making this branch of the profession his life work from that time on. For thirteen years Mr. Weickel was connected with this concern when they disposed of their crane interests to the Brown Hoisting and Conveying Machinery Co., Cleveland, Ohio. He then became identified with the Cleveland company, in whose employ he remained until the fall of 1900, when he accepted a position with the Pawling & Harnischfeger Co., Milwaukee, manufacturers of electric cranes. He was actively identified with the designing of cranes, and for a number of years, up to the time of his death, was consulting engineer for the company.

Mr. Weickel became a member of the Society in 1895. He was a charter member and past president of the Milwaukee Section of the Society.

ALBERT SCHMID

Albert Schmid, who was so closely identified with the early development of electrical machinery in the United States and prominent in the electrical world of France, Switzerland, Italy and Great Britain, died on December 31, 1919, in New York.

Mr. Schmid was born in Zurich, Switzerland, in 1857, and received his education in that city. He began his real career by entering the employ of the French Westinghouse Air Brake Co., where Mr. Westinghouse met him in the early eighties and being impressed by his ability invited him to come to this country.

Soon after his arrival Mr. Schmid turned his attention to designing work for the Westinghouse Air Brake Co., then located in Allegheny, Pa., where his keen mechanical perception and insight brought him

rapid advancement. When Mr. Westinghouse became interested in the Union Switch & Signal Co. and started there his original electrical work, he engaged Mr. Schmid as his chief designer and engineer in that field. In 1886 he was transferred to the newly created Westinghouse Electric Co., becoming its first chief engineer and in 1896 its general superintendent.

In 1897 he went to Europe for the purpose of studying the continental development in the electrical art and the manufacturing possibilities there, and as a result of this trip, the formation of the French Westinghouse Co. was soon under way. He was made director general of that organization. He also held the positions of director of the Westinghouse Electric Co., Ltd., England, president of the Compagnie des Lampes a Filament Metallique of France and at the time of his death in addition to his position as consulting engineer for the American Westinghouse Co., represented the Westinghouse Lamp Co., and had general supervision of its interests abroad.

It can be said truly that Mr. Schmid ranked foremost in the field of mechanical design among the engineers of the last century, and the creations of his mind constitute an enduring monument to his genius.

Mr. Schmid became a member of the Society in 1890.

PERSONALS

In these columns are inserted items concerning members of the Society and their professional activities. Members are always interested in the doings of their fellow-members, and the Society welcomes notes from members and concerning members for insertion in this section. All communications of personal notes should be addressed to the Secretary, and items should be received by March 15 in order to appear in the April issue.

CHANGES OF POSITION

Theodore Maynz has severed his connection with the Gulf Pipe Line Company, of Houston, Tex., and is now with the Cleveland Electric Illuminating Company, of Cleveland, Ohio, in the capacity of testing and efficiency engineer.

William B. Corbett has severed his connection as checker with the Terry Steam Turbine Company, Hartford, Conn., to become affiliated with the mechanical drafting division of the Stone and Webster Company, of Boston, Mass.

Louis Mardaga, formerly sales engineer, Mickle Milnor Engineering Company, Philadelphia, Pa., has accepted a position with the Lehigh Coal and Navigation Company, Lansford, Pa.

Ferdinand L. Snyder has resigned his position as assistant engineer, the Baltimore Copper Smelting and Rolling Company, to assume the position of efficiency and assistant plant engineer, Portsmouth Cotton Oil Refining Company, Portsmouth, Va.

Henry A. Brown, formerly Captain, Ordnance Department, U. S. A., in charge of manufacturing operations in the Armory of Rock Island Arsenal, has severed his connection with the Rochester office of the Brown and Sharpe Manufacturing Company, and has been elected vice-president, in charge of engineering and sales, with A. C. Towne, Inc., Buffalo, N. Y., small tool specialists, and district representatives of the Illinois Tool Works.

S. E. Flexer, until recently associated with the Hercules Cement Corporation, Nazareth, Pa., has accepted the position of assistant to the chief engineer, H. G. Barnhurst, of the Fuller Engineering Company, Allentown, Pa.

Norman L. Baker has accepted a position with the Curtis and Company Manufacturing Company, St. Louis, Mo. He was formerly connected with the American Steel Foundries, East St. Louis, Ill.

Cyrus W. Bassett, formerly assistant manager, Budd Wheel Corporation, Philadelphia, Pa., has become affiliated with the production department of Bethlehem Steel Company, Bethlehem, Pa.

Herbert V. Darrow has assumed the duties of general superintendent of The Webb Development Company, Cleveland, Ohio. He was formerly connected with the Degnon Construction Company, Allaben, N. Y.

Geo. L. Bohannon, until recently chief engineer, The Youngstown Steel Car Company, Youngstown, Ohio, has accepted a position with the Thomas Spalding Machine Company, Pittsburgh, Pa.

Edward H. Reeves has recently resigned his position as scientific assistant in the U. S. Public Health Service, and has assumed the duties of night superintendent of the Acme Wire Company, New Haven, Conn.

J. H. Bickey has become connected with the Reading Iron Company, Scott Foundry Department, Reading, Pa., in the capacity of superintendent. He was formerly general superintendent of the Pennsylvania Brake Beam Company, Danville, Pa.

ANNOUNCEMENTS

M. A. Pearson, chief engineer of the Allen Machine Company, of Erie, Pa., until February, is now eastern and export representative of the same company, with office in New York.

George S. Blankenhorn has recently resigned as engineer, Philadelphia district, Wilson Snyder Manufacturing Company, to take up general engineering work in Philadelphia.

Robert I. Miner has assumed the duties of manager of the Detroit office of The Bossert Corporation of Utica, N. Y.

Charles Eisler, an expert on incandescent-lamp-making machinery, has just completed one of the most modern lamp factories for the Save Electric Corporation, and has accepted the position of consulting engineer and vice-president of the Newark Engineering and Tool Company, now specializing on lamp machinery. Mr. Eisler was, for many years, connected with the Westinghouse Lamp Company.

Walter C. Robbins, formerly chief engineer for the Curtiss Aeroplane and Motor Corporation, Buffalo, N. Y., severed his connection with that company, January 1, to start a consulting engineering business with his former assistant, Edwin G. Hempel, under the firm name of Robbins and Hempel, with main office in Buffalo, N. Y. The firm will handle work in connection with internal-combustion engines, manufacturing, aeronautics and automobiles.

Colonel Gabriel R. Solomon, recently officer in charge of engineering branch, construction division of the Army, and formerly of the Solomon-Norcross Company, consulting engineers of Atlanta, Ga., has resumed engineering practice as vice-president of the Fuller Industrial Engineering Corporation, New York.

APPOINTMENTS

Howard P. Fairfield has been appointed professor of machine construction, Worcester Polytechnic Institute, Worcester, Mass. He was formerly assistant professor of machine construction at the Institute.

Robert G. Pilkington, of Chicago, has been appointed experimental engineer by the Wahl Company. His duties will consist of the consideration of designs, materials and processes to be used in connection with the manufacture of the adding machines, Eversharp pencils and fountain pens made by the company.

Section Meetings

Atlanta:

February 24. Building a 30,000-kw. Turbo Set, by H. E. Bussey, District Engineer, General Electric Co.

Baltimore:

February 11. The Development of Long-Distance Electric Power Transmission, by P. M. Lincoln, Consulting Engineer, Cleveland, O.

February 18. The Purchase and Erection of Engineering Equipment, by A. S. Loizeaux, Electrical Engineer, Consolidated Gas Electric Light & Power Co.

February 25. City Planning and Its Relation to Municipal Development, by Nelson P. Lewis, Chief Engineer, Board of Estimate & Apportionment, New York.

February 27. Council Meeting. Informal Dinner attended by the Mayor, City Superintendent of Schools, Council, Sections Committee, Executive Committee of the Baltimore Section, representatives of the Engineers' Club and members of the Philadelphia and Washington Sections. Evening meeting on Vocational Education.

February 28. Visit to Experimental Stations and Laboratories of the U. S. Naval Academy at Annapolis; luncheon at Carvel Hall.

Boston:

February 3. Dinner meeting of A. S. M. E. & A. I. E. E. Large Turbo-Generator Units from the Operator's Standpoint. Discussion opened by Farley Osgood, Vice President, Public Service Electric Co., Newark, N. J. Engineering Research, by E. H. Colpitts, Western Electric Co.

BUFFALO:
February 24. Wage Payment, by A. L. De Leeuw, New York City.

CHICAGO:
January 23. Fuel for Internal Combustion Engines, the Lubrication and the Motor Itself, by William F. Parish, Sinclair Oil Co. Mr. Arthur L. Rice, Chairman of Chicago Section, spoke on the Jones-Reavis Bill and the proposed National Department of Public Works.
February 16. Joint meeting of the A. S. M. E. and Western Society of Engineers. Factory Fire Protection, by Benjamin Richards, Chief Engineer, Western Factory Insurance Association.
February 28. Joint meeting of the A. S. M. E. and Western Society of Engineers. The Washington Award will be presented to Mr. Herbert Hoover.

CINCINNATI:
January 15. The Evolution of Automotive Electrical Ignition, by R. C. Fryer.
February 19. Joint meeting with Engineers' Club of Cincinnati. The Engineer and the Markets of the World, by Dean Herman Schneider, University of Cincinnati.

CLEVELAND:
February 24. Joint meeting of A. S. M. E. with C. E. S. A Photographic Study of the Sounds of Large Guns, by Dr. Dayton C. Miller, Case School of Applied Science, Cleveland, Ohio.

COLORADO:
January 23. What the United States Engineers Did in France, by Major Charles Larsen.

EASTERN NEW YORK:
February 20. Performance Tests on Aeroplanes, by A. R. Stevenson, Jr., and Supercharger for Aeroplane Engines, by S. A. Moss.

ERIE:
February. Talk by Dr. Ira N. Hollis.

INDIANAPOLIS:
January 23-24. Joint meeting of Indiana Engineering Society, A. S. M. E., A. I. E. E., A. A. E., Scientech Club and Indiana Society of Architects.

LOS ANGELES:
February 10. Meeting with Dean Dexter S. Kimball. Solar Work at the Mount Wilson Solar Observatory, by Dr. St. John.

MINNESOTA:
February 20. Coals and Coal Analysis, by W. D. Langtry, Commercial Testing and Engineering Co., of Chicago, Ill.

MERIDEN BRANCH:
February 10. Methods of Measuring and Manufacturing to the Millionth of an Inch, by W. H. Weingar, Pratt and Whitney Co.

NEW HAVEN BRANCH:
January 21. Joint meeting with Winchester Engineers' Club. Appraisal and Valuation Methods, by J. G. Morse.

NEW YORK:
February 10. Alloyed Aluminum as an Engineering Material, by G. M. Rollason, Aluminum Manufacturers, Inc.

NEW ORLEANS:
February 9. Special Meeting to discuss proposed National Department of Public Works.

ONTARIO:
February 2. Meeting with Secretary Rice. Industrial Relations by R. W. Gifford, Supt., Massey Harris Works.

OREGON:
January 29. Talk by Dean Dexter S. Kimball.

PHILADELPHIA:
February 24. Navy Night: War Time Naval Engineering, by Comdr. J. S. Evans, U. S. N., Bureau Steam Engineering, Washington, D. C.

PITTSBURGH:
January 16. Organization meeting of the members in the territory of Pittsburg, Pa., at which a petition was signed by the members. This petition was granted by the Council at its January meeting, and there exists from January 24th, a Pittsburgh Section of the Society including the territory within a radius of 30 miles from Pittsburgh, and the cities of Butler, Washington, Johnstown, Franklin, Uniontown, Connelsville, Pa., and Steubenville, Ohio, and Wheeling, West Va.

ROCHESTER:
February 4. The Engineer's Participation in Engineering Phases of Public Affairs, by Secretary Rice.

ST. LOUIS:
February 20. New By-Product Coke Plant at Granite City, by Mr. P. E. Irvine, Granite City Plant, St. Louis Coke & Chemical Co.

SAN FRANCISCO:
February 5. Talk by Dean Dexter S. Kimball.

VIRGINIA:
January 26. Informal address by Earl F. Scott, member of the Council; election of officers.

WASHINGTON, D. C.:
January 29. Experience with the Ricardo Engine for Tanks in France, by Major Ralph Sasse, U. S. A. Experience with the Diesel Engine for Submarines, by Lieut. Comdr. M. C. Bowman. Artificial High Altitude for the Study of Aircraft, by Dr. A. C. Dickinson, Bureau of Standards, Washington, D. C.

WASHINGTON STATE:
January 27. Dean Dexter S. Kimball addressed the engineering students of the University of Washington.
Supper meeting. Dean Kimball spoke at joint session of combined engineering societies of Seattle.
January 28. Dean Kimball spoke at informal luncheon at the Engineers' Club.

WORCESTER:
February 10. Industrial Relations, by Robert B. Wolf, Industrial Engineer, New York City.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society records.

TECHNICAL GRADUATE; construction experience and familiarity with operation and power cost accounting essential. Must be able to supervise design and construction of power house changes and additions; familiarity with steel work and piping layouts required. R-1911.

EXPERIENCED LOCOMOTIVE DESIGNERS, DETAILERS, and TRACERS: wanted by firm of locomotive builders. Detailers and tracers without locomotive experience will be considered. Location Pennsylvania. R-2280.

MACHINE-TOOL SALESMAN for foreign work. Must be technical graduate with some experience in machine tools. Foreign language not necessary but desirable. Location New York City. Z-140.

EXPERIENCED COMPUTER, transitman and rodman. Location Long Island. Z-149.

MECHANICAL ENGINEER two years out of college, with manufacturing and machine shop experience, for sale work for company manufacturing trucks. Duties would be to visit shipyards and report upon conditions and means of transportation. Pratt Institute or Brooklyn Polytechnic man desired. Location New York City. Z-150.

ENGINEER with one or two years' experience in efficiency or scientific management work. Location Brooklyn, N. Y. Z-151.

YOUNG MAN having tact and pleasing personality to take charge of mail, make out reports, meet members and do general office work in connection with Standardization Committee of Technical Society. Location New York City. Z-154.

RECENT MECHANICAL ENGINEERING GRADUATES or men who have not completed college course for training for industrial work. Location New Jersey. Z-143.

FOUNDRY SUPERINTENDENT—in light grey iron foundry producing quantity work and some jobbing. Practical experience and ability to handle men and get production considered more essential than technical qualifications. Technical assistance will be rendered if and when needed. Open shop employing total of about 100 men in Eastern Pennsylvania. Z-158.

TECHNICAL GRADUATE, preferably a mechanical engineer, with about ten years' experience in general engineering practice, to direct the work of large drafting room and ordering of materials for construction of plants all over the world. Should have had drafting room experience and held executive positions; should be good executive with about ten years' of engineering experience, and possess good personality and judgment, initiative, and common sense. Location Elizabeth, New Jersey. Z-159.

TECHNICAL ENGINEER with at least two years' experience in operation of steam power plants, duties would include estimates, reports and general work of an engineering nature required by large central station and isolated heating plants. Position is in steam engi-

neering department of public utility. Location St. Louis, Mo. Z-161.

EXPERIENCED SALES MANAGER, preferably technical graduate, with engineering experience, who has specialized in elevating, conveying and mechanical power transmission machinery. Location New York City. Z-162.

SUPERVISING ENGINEER, experienced in design of unit machines, elevating, conveying and mechanical transmission machinery for flour and cereal mills. Location New York City. Z-163.

RECENT GRADUATES of mechanical or electrical engineering courses for engineering work connected with production of electrical and mechanical devices. Send application to Mr. J. C. Wilson, the Cutler, Hammer Mfg. Co., Milwaukee. State training, experience in industrial plants, if any, references and other information concerning yourself. Z-164.

STEEL DESIGNERS for checking work on New York Court House. $1.25 per hour. Location Boston and New York City. Z-171.

RECENT GRADUATE ENGINEER for work in submarine and turbine department of manufacturing company. Location New York City. Z-172.

MECHANICAL DRAFTSMAN for detail work, with company manufacturing automobile accessories such as shock absorbers, jacks and bumpers. Salary $30 per week. Location Jersey City, N. J. Z-174.

DRAFTSMAN—Large copper company in the southwest needs first class draftsman with structural steel experience on both design and detail. Applicants should state in detail experience, education, references, salary expected and send sample of work. Man with mining or mill experience also desired. Z-176.

STRUCTURAL DRAFTSMEN, DETAILERS, AND CHECKERS wanted for office building and theater work. Old established concern. Steady employment. Substantial wages. State experience and wages desired. Location Boston. Z-177.

INSTRUCTOR in vocational department to teach mechanical drawing. Work is in connection with rehabilitation of disabled soldiers. Courses will be given in sketching and reading of blue-prints, to men training to be electricians, etc. Courses will also be given leading to vocations of mechanical draftsman, architectural draftsman, machine designer, etc. Salary offered, $175 per month. Work begins at once. Z-178.

CHIEF DRAFTSMAN to take charge of drafting room of industrial plant. Should be graduate from some suitable school in course of engineering, preferably mechanical; should have had about eight years' experience in shop work, construction work and designing. Personality must be such as to fit for leadership of subordinates and coöperation with associates; these qualifications are essential toward insuring opportunities for advancement in the service. Location New Jersey. Z-179.

HEAD OF CIVIL ENGINEERING DEPARTMENT for Southern University; man with good training, personally competent to head department of growing importance, and man of first-rate personality in every way desired. The situation in State is such that man should be able to make contacts with such State Departments as the State Highway Commission. An all-round man wanted. Salary would be around $3,500, with good opportunity for the future. Z-180.

MECHANICAL ENGINEERS AND ESTIMATORS with experience in valuation of industrial properties. Two openings, one at $3600 and the other $2600. Z-183.

ENGINEER for supervising the construction of hydroelectric power plant. Vacancy will call for resident civil engineer to supervise construction, including dam, power station and transmission line. Previous experience in similar work essential. Location Northern Ontario, Canada. Z-186.

MECHANICAL DESIGNER for rolling mill and heavy machinery work. Salary $40 per week. Location New Jersey. Z-190.

FIRST CLASS STEAM-HEATING DRAFTSMEN for industrial buildings. Location New York City. Z-191.

HEATING AND VENTILATING DRAFTSMAN; young engineer able to do draftiig and field work would be considered. Man with personality seeking permanent position desired. Location Harrisburg, Pa. Z-192.

CHIEF DRAFTSMAN for company manufacturing machinery and special apparatus, such as stills, tanks and metal work of all kinds; similar experience desirable but not essential. Salary $50 per week. Location vicinity of Bridgeport, Conn. Z-194.

RECENT TECHNICAL GRADUATE, with some executive ability, who wishes to take up work in engineering department of public utility in Middle West. Salary to start $100, with excellent opportunity for advancement. Applicant need not have any particular experience, providing he has the capacity for learning. Z-203.

SALES ENGINEERS to represent manufacturer of hoisting engines, derrick irons, steel derricks, railroad, ditchers, log loaders, and locomotive cranes. Z-204.

DRAFTSMEN; experienced in designing of tractors, including engines, transmissions, chassis, and assembly work. Location Detroit, Michigan. Z-206.

EXPERIENCED DESIGNER of high-speed steam engines for stationary and marine use. Necessary that applicant should have very thorough experience in up-to-date practice. Position would offer very excellent opportunities for the right man. Location New York City. Z-208.

ENGINEERS FOR INDUSTRIAL WORK; openings as follows: (A) assistant assayer, salary $30-$35 per week; (B) smelter foreman, salary $30-$35 per week; (C) electrolytic tank-house foreman, salary $30-$35 per week. Location New Jersey. Z-209.

MACHINE DESIGNERS with several years' experience in designing automatic machines, automatic attachments for machines, etc. Man with technical education, preferably between the ages of 25 to 37, desired. Work is largely that of laying out machines on the board and following their construction to successful completion after the drawings are turned over to the shop. Salary from $2700-$3000 per year depending upon qualifications. Location Cleveland, Ohio. Z-211.

MECHANICAL DRAFTSMAN, thoroughly familiar with pipe line work, power house layouts and general conduit work. Position will offer splendid opportunity for advancement. Salary about $3000 per year. Location Dayton, Ohio. Z-212.

DRAFTSMAN, college man with few years' experience, capable of making drawings of machinery and buildings for repairs and extensions at chemical-metallurgical plant near Pittsburgh and working under older engineers. Position will afford good experience in designing, maintenance and construction. Z-213.

POWER-SALESMAN: graduate electrical engineer; familiar with electrical machinery and capable of studying and developing applications for the use of electricity. This is a very good opportunity for capable and energetic young man. Location Minnesota. Initial salary $150. Z-214.

MACHINE DESIGNER; broad experience required with such work as automatic printing, paper feeding, wrapping, package, carton or box machinery. Must have inventive ability and productive record sufficient to warrant assuming responsibility for developing new machinery of an important and difficult nature. Exceptional opportunity to right man for permanent position and attractive salary with well established and growing concern. Location Boston suburb. Give experience when replying. Z-215.

ENGINEER experienced in processing pressed steel such as used for electric outlet boxes and conduct experimental work. Experience in non-ferrous metals or alloys only will not be sufficient. Location New Haven, Conn. Z-216.

ENGINEERS AND DRAFTSMEN for Corliss, Uniflow, and marine engine, sugar mill, plate glass table, and special heavy machinery work. Salary $35-$60 per week depending upon qualifications. Location Ohio. Z-219.

ESTIMATING ENGINEERS with experience in estimating machine work to handle special work and to assist sales force when necessary. Must be able to take blue prints of special machinery and give complete estimate in number of machine hours required for each operation in the machining of such parts. Location Ohio. Z-220.

PRODUCTION MANAGER of proven ability for reliable and established concern manufacturing high grade specialty. Location Ohio. Address stating age, experience and salary. Z-221.

INSTRUCTOR IN SURVEYING is desired in the school of civil engineering at middle western university as soon as possible after the first of February, at a salary of from $1400 to $1800, depending upon the experience and ability of the man. Z-222.

YOUNG ENGINEER to follow up the invention and development of oxy-acetylene apparatus. Position will lead to promotion into the factory or sales work depending upon candidate's qualifications. Location New Jersey. Z-223.

SALES ENGINEER: should preferably be familiar with power-plant equipment, including steam turbines, centrifugal pumps, engines, boilers, reciprocating pumps, etc. High-grade man required and one of experience preferred. Location Philadelphia, Pa. Z-224.

MECHANICAL DRAFTSMAN with experience with such concerns as Crane Company, Babcox & Wilcox, and Worthington Pump Company, for position with company manufacturing safety valves and pressure gages. No recent graduates considered. Salary $45 per week, plus. Location Connecticut. Application by letter. Z-139.

TECHNICAL GRADUATES wanted for engineering calculations, draftipg and research work in connection with steam turbine design, leading to engineering positions. Location Massachusetts. Z-229.

FIRST-CLASS ENGINEERS AND DRAFTSMEN experienced in design of heating and ventilating systems, power plants, electric wiring layouts, sprinkler systems and plumbing. Salary ranges from $200 to $300 per month; in reply state education, experience in detail, salary expected and earliest date you could report for work. Address Smith, Hinchman and Grylls, Architects and Engineers, 710 Washington Arcade, Detroit, Michigan. Z-230.

DESIGNER for machinery layouts for large manufacturing plant. Beside the location of machinery for efficient production duties would include other layout work for rolling mill. Good opportunity for advancement. Salary $250 per month. Location Pittsburgh, Pa. Z-232.

LUBRICATION ENGINEER; graduate chemical or mechanical engineer, former preferred; knowledge of steam and gas engine and electrical and general machinery desirable. If possible should be familiar with oil business. While sales experience is not essential, it is desirable, as successful applicant will be in charge of sales work. Location Maryland. Z-236.

ELECTRICAL ENGINEER, technical graduate, about 25 years of age, to have charge of all electrical equipment and part of the mechanical equipment of an industrial plant. Location New York City. Z-238.

BUILDING INSPECTOR and material man for large hotel construction, with experience in all building details as well as in reinforced concrete in building construction. Location Pennsylvania. Z-239.

MECHANICAL ENGINEER; must be able to decide upon methods and equipment required for manufacturing various products, and be capable of engineering any special machinery

needed. Technical education, and 8 to 12 years' experience on manufacturing processes and equipment preferred. Location Middle West. Z-241.

PLANNING ENGINEER with 8 to 10 years' experience in manufacturing work, and several years' experience in planning for quantity production of small apparatus on an interchangeable part basis. Location Middle West. Z-242.

MANUFACTURING EXPERT with 12 to 15 years' experience on quantity production of small interchangeable parts. Must be familiar with construction and operation of commercial manufacturing machinery and capable of designing special process machinery. Location Middle West. Z-243.

DESIGNERS AND DRAFTSMEN for paper mill work on structural design and plant layout. Location New York City. Z-244.

OIL-ENGINE EXPERIMENT ENGINEER to take charge of experiments made in the factory. Should be experienced man, not new in oil-engine line and able to conduct test floor in intelligent way. All experiments are to be made under his supervision and he is responsible for them. Man who held similar position before preferred. Location New York City. Z-245.

TWO FIRST-CLASS DRAFTSMEN who understand machine construction. Location Greenfield, Mass. Z-247.

COMBUSTION ENGINEER; at least 30 years of age, with oil burning experience if possible. Location New York City. Z-250.

RECENT GRADUATE IN MECHANICAL ENGINEERING as office assistant with firm of importers and exporters. Good chance for advancement. Location New York City. Z-252.

EXPERIMENTAL ENGINEER to study problem of waste disposal under supervision. The work will be partly chemical laboratory work of the simpler kinds and partly hydraulic experimental work. Young engineer desired. Position is at government arsenal in New Jersey. Maximum salary $200 per month. Z-255.

YOUNG CHEMICAL ENGINEER familiar with quantitative analysis, elements of organic chemistry, and chemical calculations. Man with good personality desired for training as assistant laboratory chief. Salary $140 per month. Location New Jersey. Z-258.

MECHANICAL DRAFTSMAN for government ordnance work, consisting of detailing designs of artillery carriages already laid out and in checking finished drawings. Men with experience in detailing of machinery, gas engines, motor vehicles, etc., could qualify. Civil service position. Salary $1600 to $2400 per annum. Location Illinois. Z-266.

SUPERINTENDENT for plaster mill; must be high grade man with executive ability. Salary $300-$400 per month. Location central west. Z-267.

MECHANICAL DRAFTSMAN; man experienced in the theory and design of steam engines preferred. Write stating qualifications and salary desired. Location New Jersey. Z-270.

INSTRUCTOR; man with at least two years' technical engineering training and experience in auto repairing and vulcanizing desired to teach blind soldiers that sort of work. Salary $125 per month or more and an engagement for one year. Location Baltimore, Md. Z-275.

ENGINEERING DRAFTSMAN for position with company manufacturing heavy saw mill machinery and doing oil refinery work. Location Texas. Z-276.

INDUSTRIAL ENGINEER who has specialized in construction or operation of plants for manufacture of soap powders and washing powders. Present plant of concern is operating in southern California, but it is proposed to build on a different site the most modern plants, both as to buildings and equipment, on the coast. Firm of industrial engineers would be considered for the work. Z-278.

QUANTITY SURVEYOR to estimate amount of material necessary for construction from plans. Must know prices of building materials, and be able to analyze bids. Industrial experience desirable. Would work with architect. Permanent position. Location Buffalo, New York. Z-230.

DESIGNER of machinery; mechanical engineer, 30-35 years of age, desired. Location New York City. Z-282.

PLANT OR WORKS ENGINEER; mechanical engineer with experience as works engineer or assistant to works or chief engineer; to assume supervision of mechanics, draftsmen, electricians and general plant maintenance and construction, also generation and distribution of power, etc. Position is with large concern where prospects are good. Experience with chemical or textile plants desirable although not essential. State experience in full, salary desired and when available. Location Cleveland, Ohio. Z-287.

SALES ENGINEER; recent mechanical engineering graduate, preferably under 25 years of age, to develop for handling line of temperature and humidity-measuring apparatus. Location New York City. Z-288.

DRAFTSMEN wanted by company manufacturing electric traveling cranes, rolling mill machinery, ordnance steel, special machinery, etc. Location Ohio. Z-291.

LARGE MINING CORPORATION, in expectation of increasing force of designing department, New York office, will require several designers, draftsmen, tracers and checkers for smelter, crushing and concentrating plant work. Applications solicited from men having the above or similar experience. Location New York City. Z-292.

MECHANICAL DRAFTSMAN for electrical and mechanical work on steam fittings and electro medical apparatus. Two men with mechanical engineering experience and two with electrical engineering experience desired. Location New York City. Z-294.

TELEPHONE ENGINEER having some operating experience and experience in the valuation of telephone properties. Salary $3600 per annum. Location Illinois. Z-295.

ENGINEER who is a good rapid draftsman, to work up detail and new things for company manufacturing pumps, pipe valves, fittings and boiler working apparatus. Location Illinois. Z-296.

PURCHASING AGENT for manufacturing plant making lawn mowers. Location New York State. Z-297.

TOOL AND MACHINE DESIGNERS, must have several years' experience in this work. Salary to start per week, $36-$46. Location Chicago, Ill. Z-300.

ARCHITECTURAL DRAFTSMEN experienced on industrial buildings. Salary to start per week, $36-$41. Location Chicago, Ill. Z-301.

PLANT DRAFTSMEN must have experience as either electrical or pipe draftsmen. Salary to start per week, $36-$44. Location Chicago, Ill. Z-302.

MECHANICAL ENGINEERS; prefer men with some shop experience, preferably in manufacture of small intricate parts. Salary to start per week, $36 and up. Location Chicago, Ill. Z-304.

TELEPHONE ENGINEERS; men with considerable electrical training, preferably on telephone work. Salary to start per week, $26-$42. Location Chicago, Ill. Z-305.

MANUFACTURING INVESTIGATORS; should have some technical training and considerable shop experience; must be able to make time studies and plan operations. Salary to start per week, $34-$40. Location Chicago, Ill. Z-306.

PROCESS ENGINEER for laying out manufacturing methods for screw drivers and cutlery. Should be technically trained, and understand manufacturing methods. Approximate salary $30-$40. Location Connecticut. Z-309.

PROCESS ENGINEER for fishing rods or reels. Should be familiar with manufacturing methods and preferably familiar with the manufacturing of fishing tackle and technically trained. Salary $30-$40. Z-310.

ESTIMATORS for determining cost of products from information furnished by process engineers. Preferably familiar with estimating, but if technically trained, estimating experience not essential. Salary $25-$35. Z-311.

GAGE ENGINEER for determining the number and types of gages necessary for manufacturing. Should understand gage making and designing, and should be familiar with manufacturing methods. Salary $30-$40. Location Connecticut. Z-312.

CARTRIDGE-PROCESS ENGINEER to assist more experienced engineer in establishing methods for manufacturing metallic and paper shells. Should be familiar with press work, and if possible experienced in working brass or other similar metals. Salary $30-$35. Location Connecticut. Z-313.

CUTLERY PROCESS ENGINEER for establishing and improving methods for manufacturing pocket knives. Should be experienced toolmaker and familiar with general manufacturing methods. Technical training preferred. Salary $30-$40. Location Connecticut. Z-314.

ENGINEER for developing packing specifications. Should be familiar with manufacturing of paper boxes, cartons, etc. Salary $28-$35. Location Connecticut. Z-315.

MALE EMPLOYMENT MAN to interview candidates and hire them for shop work. Must have had shop experience and be able to handle men. Location Connecticut. Z-316.

DRAFTSMEN AND DETAILERS; experienced jig and fixture designers wanted for work in Connecticut. Apply by letter, stating age and experience. Salary $35-$45 per week according to experience and ability. Z-317.

MACHINERY PURCHASING AGENT for large manufacturing company in the East. Technical graduate not over thirty-five years of age with knowledge of sources of supply and construction of both small and heavy machinery and tools of all descriptions. Knowledge of rubber machinery preferred but not essential. Give references and salary expected to start. Z-318.

INDUSTRIAL PLANT DRAFTSMAN familiar with power plant work, machinery installation and building design for large and progressive concern located in the south. Salary $45 per week. For particulars address General Superintendent, P. O. Box 1579, Savannah, Ga. Z-321.

SEVERAL DRAFTSMEN, all grades, familiar with merchant and naval-marine installations. College men with other experience considered. Location Pennsylvania. Z-322.

GOOD OPENINGS WITH CEMENT PLANT for mechanical draftsmen and designers familiar with elevating and conveying machinery and general plant layout. In reply state age, nationality, education, experience, salary expected, and how soon available. Location Pennsylvania. Z-324.

CHEMICAL ENGINEER with two or three years' experience in manufacture of heavy chemicals, more preferably acids; this man at first to be an assistant to general sales engineer, afterwards to go to one of the district offices as district office engineer. Salary to start will be moderate, but unusual opportunity for early advancement. Technical education, of course, is virtually essential. Location Ohio. Z-325.

PURCHASING AGENT with engineering education, and experience in the purchasing of materials used in engineering and construction work, such as power plant and factory construction and equipment. Man twenty-eight or thirty years old preferred. Location New York City. Z-329.

METALLURGICAL CHEMIST competent to assist in the development of new metallurgical testing laboratory, and to superintend metal-

lurgical testing work. Laboratory is contemplated for purpose of testing artillery ammunition metal components. These will include shell material (steel, semi-steel and cast iron), fuse material (brass), and other material of similar nature. It is proposed to handle all chemical analysis and testing of this class of material and the usual physical tests, such as tensile strength, compression, Brinnell hardness, photomicrographic, etc. Young man recently graduated from the metallurgical department of high-grade institution desired to grow up with development of the laboratory. Salary about $2200 to start. Z-330.

OPERATING ENGINEER to take charge of eight-hour shift in a 30,000-kw. central station. Young technical man if possible, to handle the system of scientific control which it is hoped to install. Position will pay about $165 per month. The shifts are working 8 hours, and the men have a Sunday off every third week, so that the position really is a little better than the average operating job. Location Pennsylvania. Z-331.

ENGINEER experienced in plane triangulation. After laying out the system in the field, according to the man, he will serve as chief of party on property surveys, or be assigned to the office as draftsman on the same work. Location West Virginia. Z-332.

ARCHITECTURAL DRAFTSMAN experienced in general construction work, preferably with experience around coal mines, who is enough of an architect to design sightly buildings. Location W. Va. Z-333.

CHIEF DRAFTSMAN who will be in charge of all draftsmen in civil, mechanical and electrical departments of industrial concern. Will need to have had broad experience in industrial-plant engineering, and be able to assist and direct draftsmen on layouts of mechanical and electrical equipment consisting principally of conveying machinery, milling and mixing equipment layouts, high-pressure hydraulic equipment consisting of high-pressure pumps, extruders, accumulators, and the pipe lines connecting same, high-pressure and low pressure steam lines and equipment, power-plant equipment, power-generating plants, and general building design work. Location Cleveland, Ohio. Z-335.

MECHANICAL ENGINEER who can specialize on layouts for all mechanical equipment used in factories. Will need to do considerable work on the board; at least half of time will be devoted to such work, the remainder in assisting our present engineer in making up estimates, reports and investigations of conditions at various factories. Location Cleveland, Ohio. Z-336.

MECHANICAL DRAFTSMAN to spend all of his time on layout and design work for mechanical equipment. Location Cleveland, Ohio. Z-337.

TOOL AND MACHINE DESIGNER—A large manufacturing concern has an opening for several first-class tool and machine designers. Must have experience on punch and die work and special machinery. In reply state age, salary desired, previous business experience, etc. Location Cleveland, Ohio. Z-339.

EASTERN CONCERN opening up complete gear-manufacturing department needs services of experienced estimator or engineer familiar with spur, worm and herringbone gear business, and capable of taking care of estimates and correspondence. Location Maryland. Z-341.

ESTIMATOR experienced in steam boilers and steel-plate work. State age, experience, salary expected and whether married or single. Southern location. Z-352.

TECHNICAL ADVERTISING MANAGER with first-class record of past service and a thorough knowledge of power-plant practice. Unusual opening for a man with brains and desire to settle permanently in the future. State minimum salary. A real job for a real man with snap and initiative. Z-353.

STRUCTURAL ENGINEER for office work to figure loads and stresses. Must be technical graduate with one or two years' experience in structural steel or reinforced concrete. Location New Haven. Z-355.

ASSOCIATE PROFESSOR OF MECHANICAL ENGINEERING — Mechanical engineering graduate who has had some practical experience and some teaching experience. Practical experience should be in shops, etc., along production lines. Railway mechanical engineering experience also very desirable. Must be resourceful, tactful, energetic and dependable, and able to get along with associates and with students. Salary $2250 for the year, of nine months. Location Texas. Z-361.

INSTRUCTOR for classes in machine design, to begin work as soon as possible. Work involves class-room and drafting-room work in kinematics and junior machine design. Bachelor's degree in mechanical engineering from recognized engineering school necessary for consideration. Recent graduate will be satisfactory. Some commercial drafting room experience desirable but not necessary. Previous teaching experience not necessary. Salary depends upon man. Z-367.

STATIONARY ENGINEER to train ex-soldiers in that line of work, in southern educational institution. In applying state training and experience, date available, and salary expected. Z-370.

MECHANICAL ENGINEER: well-established builder of a.c. and d.c. generators and motors, desire high-class man experienced in mechanical design of electrical machinery. Immediate opening. Location Ohio. Z-371.

TOOL DESIGNER, capable of assisting mechanical superintendent in the design and standardization of tools for manufacturing small, interchangeable wire and sheet metal parts. The applicant must be a man of practical experience, thoroughly equipped, age between 30 and 40. Location Massachusetts. Z-372.

SALES ENGINEERS to handle line of pneumatic tools. Location New York City. Z-373.

MECHANICAL ENGINEER experienced in design and manufacture of internal-combustion engines, and if possible familiar with farm tractor business. Location Buffalo, N. Y. Z-375.

MECHANICAL ENGINEERS, technical graduates, with few years' experience: (A) one man for general engineering work, (B) one for special work in connection with investigation of new industrial applications of company's standard apparatus, and (C) one for engineering sales work, to handle inside sales details and correspondence of important department. Location New York City. Z-377.

MACHINE DESIGNER, experienced on printing machinery or medium-weight automatic machinery. No calculations. Some machine-shop experience desirable but not essential. Location New York City. Z-378.

RECENT GRADUATE from some reputable technical school, whose training has been in mechanical or electrical engineering and who would fit into power-plant work, covering tests, analysis, design and construction. Location Connecticut. Z-382.

PLANT ENGINEER, young man, technical graduate, with 6 or 8 years' practical experience, and capable of taking entire charge of construction and maintenance of cloth finishing plant of considerable size. Location Rhode Island. Z-383.

SQUAD BOSS for drafting room. Man capable of designing all kinds of elevators, conveyors and power transmission machinery, also experienced in checking and directing the work of detailers and tracers. State in first letter education, experience in detail, age, nationality, salary required and when available. Address Meese and Gottfried Co., 660 Mission St., San Francisco, Cal. Z-384.

INDUSTRIAL ENGINEER: technically-trained men to become efficiency and cost expert for wood-working association. Employment by year with expenses paid. Traveling mostly in Central Western section. Address Thomas D. Perry, Grand Rapids, Mich. Z-385.

INDUSTRIAL ENGINEER: young technical graduate with 1 or 2 years' experience in production and time study work. Opportunity good. Location Central New York, in large factory making small interchangeable parts. Z-386.

CONSTRUCTION ENGINEER, preferably of college or technical training, with experience in handling of material coming into the construction of power houses and sub-stations along mechanical lines from driving the piling to completing the stacks. Should be conversant with design so as to be able at least to make initial computations to check designs against constructional experience. Organization is such that man is not only brought closely in contact with design work but is given opportunity to familiarize himself with operating conditions. Location Rhode Island. Z-388.

POWER-HOUSE SUPERINTENDENT, with first-class license and acquainted with up-to-date power plant practices, connected with production of steam, electricity and refrigeration. Technical graduate preferred. Location Massachusetts. Z-391.

SUPERINTENDENT—Factory in New England manufacturing small machinists' tools, at present employing about 200 but with excellent prospects for increase, has position for superintendent, who is anxious to firmly and permanently establish himself and who has ability to eventually assume full charge of manufacturing end of business. Requirements: familiarity with production of similarly accurate small pieces of high quality; proven ability in handling employers; proven ability in mechanical lines with reference to standard and special machinery for efficiently doing work. When applying give full information, and especially full detailed record of past employment. Z-394.

OPERATING ENGINEER for power plant of large manufacturing establishment. Location New Jersey. Z-395.

ENGINEER to take charge of textile machinery. Graduate of technical school of recognized standing, who has had experience, preferably in textile mills or bleacheries, desired. Location New York City. Z-396.

YOUNG MAN, with some engineering experience, desirous of securing position where there is an opportunity to take up sales work with industrial concern. Location New York City. Z-397.

DRAFTSMEN with considerable experience in heating and ventilating work. Location New York City. Z-398.

MECHANICAL ENGINEER OR MASTER MECHANIC with good shop-practice training, capable of supervising and directing the operation of shops consisting of equipped machine shop—30 mechanics, and equipped carpenter shop—20 carpenters. Duties of position are to maintain existing plant buildings, machinery, tools, furniture and fixtures, construct special tools and equipment, and erect new plant equipment. Capable, energetic, determined director, not over 45 years of age, willing to start at salary not over $4000 per year. Z-400.

DESIGNERS AND DRAFTSMEN with extensive experience in power plant piping work. Location Atlanta, Ga. Z-401.

ENGINEERING DRAFTSMEN with considerable direct experience on map work; good letterers; quick and accurate understanding plotting from field notes, property surveys, computations, etc. Location Delaware. Z-405.

STRUCTURAL ENGINEER familiar with designing of steel and reinforced concrete buildings. Essential that the applicants be engineer graduates. Location Philadelphia, Pa. Z-406.

TOOL DESIGNERS; must be experienced; 80c. per hour; 48 hours per week. Location New York State. Z-407.

MECHANICAL DESIGNER, able and experienced, preferably with a mechanical engineering degree. Position is one of responsibility and calls for familiarity with chemical-plant layout work. Will pay up to $50 per week depending upon qualifications. Location New York City. Z-409.

DESIGNERS for industrial-plant layout work, including machine and equipment location, small power plant work, and some building and structural steel work. Location New York City. Z-410.

SALES ENGINEER with experience in sales and good knowledge of steam engineering. Job would be to specialize particularly on sale of Uniflow and other types of engines, fire tube and water tube boilers, copes regulators and other accessories. Compensations on commission basis, salary and expenses. Position should easily net $4000 or more a year. Location New York State. Z-411.

DESIGNER; must be experienced in sawmill machinery and able to get designs ready for shop without supervisor. Mill contractor specialist cannot fill position. Location Michigan, 250 miles north of Chicago. Z-414.

DRAFTSMAN for heavy reciprocating machine-pumps; engine or crane work experience would be acceptable. Location Michigan, 250 miles north of Chicago. Z-415.

EXPERIENCED DRAFTSMAN, thoroughly familiar in raw sugar and refinery work, wanted at once for position in New York. Give full particulars. Z-416.

GENERAL FOREMAN OR OPERATION SUPERVISOR for machine-tool works, manufacturing lathes, screw machines, universal grinders, etc. Must be very good mechanic, with ingenuity, long experience and good judgment for suggesting best way of performing each machine operation, and jigs and tools required. Must be especially competent in trying out the highest possible speed of each operation, and in determining highest speed of production that can be maintained safely. Will have charge of set-up, speed setting and progress inspection. Location Massachusetts. Z-417.

EXECUTIVE SECRETARY—We have an attractive opening, probably to locate at our Cleveland office, for a technically-educated man, preferably between 30 and 35 years old, who has broad experience in manufacturing business using steel as raw material. Familiarity with cost accounting, sales, statistics and general administrative features of such business essential. Candidates must possess ability to meet and tactfully deal with business executives, and a ready command of written English. In reply state age, college or technical school from which graduated, date and degree, whether married or single, specific, chronological account of business experience, present and expected salary. SCOVELL, WELLINGTON & COMPANY, Certified Public Accountants and Industrial Engineers, New York, Boston, Springfield, Cleveland, Chicago. Address reply to 110 State St., Boston, Mass. Z-418.

MACHINE DESIGNERS to go ahead and design machines from the ground up when furnished with necessary data on requirements. Would be called upon to design fine tool machines. Location Massachusetts. Z-424.

SHOP SUPERINTENDENT for company manufacturing general line of machinery; must understand machine shop, foundry and plate work. Exceptional opportunity for right man. Location Canada. Z-425.

YOUNG MAN with technical education to break in as a safety engineer for an industrial plant. Location Massachusetts. Z-426.

ESTIMATORS experienced in building construction work and in general equipment work. Location Delaware. Z-427.

GENERAL ARRANGEMENT DRAFTSMEN, first class for work on mechanical and chemical layout; should have experience with piping, installation of chemical apparatus, mechanical transmission and general engineering drafting. Should possess originality, ambition and initiative. Location Delaware. Z-428.

REINFORCED-CONCRETE DRAFTSMAN familiar with factory buildings, office buildings, coal and ash hoppers, etc., and preferably with some designing experience. Location Delaware. Z-429.

REINFORCED-CONCRETE DRAFTSMAN with experience in designing concrete forms for all kinds of concrete work. Location Delaware. Z-430.

MECHANICAL DRAFTSMAN experienced in machine design, both designing and detail, and, if possible, with some experience in general arrangement and layout work. Location Delaware. Z-431.

MECHANICAL DRAFTSMEN experienced in heating and ventilating work. Location Delaware. Z-432.

ENGINEER experienced in time study for position with factory manufacturing all kinds of wire for electrical purposes. Location New York State. Z-433.

DESIGNING DRAFTSMAN with heating and ventilating experience. Duties will comprise both field and board work. Salary $40 plus per week. Location New York City. Z-435.

RECENT MECHANICAL ENGINEERING GRADUATE for position with explosives-manufacturing company. Location New York City. Z-436.

DESIGNER for paper-mill machinery. Must be experienced A No. 1 man. Location Wisconsin. Z-437.

CIVIL ENGINEERS with broad construction and executive experience for work in Wilmington. These must be men not only possessing technical knowledge and ability, but also good business judgment, tact and strong executive capacity. Z-439.

CIVIL ENGINEERS to take charge of outside work. Experience in modern factory building construction and good executive ability essential. Location Delaware. Z-440.

PROJECT ENGINEERS with engineering education and broad general engineering experience. Knowledge of design work essential. Duties consist roughly of taking charge of projects from their inception through the preliminary drawings and estimates to finished drawings and specification. Location Delaware. Z-441.

MECHANICAL AND ELECTRICAL ENGINEER familiar with designs and construction of factory power plants, heating systems, and general lighting and power wiring for industrial plants. Work will consist of supervision of design and installation of mechanical and electrical features of industrial plant equipment. Location one of largest cities of southeastern Canada. Z-442.

MAINTENANCE ENGINEER to have entire charge of repair shop and to organize maintenance work. Must be graduate mechanical engineer with 4 to 5 years' experience. Location New Jersey. Z-445.

STRUCTURAL DRAFTSMAN AND TWO DETAILERS OR TRACERS; (A) position of structural draftsman will be principally on crane work, at hourly rate which will net $43 a week; (B) technical graduates just out of school can qualify as detailers and tracers at an hourly rate which will net $25 per week. Company employs 650 men. Plant is located in small village 18 miles north of Elmira, N. Y. Z-447-A&B.

MECHANICAL OR ELECTRICAL ENGINEER with good knowledge of general power-plant work for board work. Salary $45-$50. Location New York City. Z-451.

BUILDING AND STRUCTURAL DRAFTSMEN AND DESIGNERS. To be used on miscellaneous building structures such as are found in manufacturing plant. Men experienced in structural-steel and reinforced concrete design required. Starting salaries approximately $200 to $225 per month . Location Ohio. Z-452.

HEATING AND VENTILATING DRAFTSMEN AND ENGINEERS—Starting salary approximately $200 to $225 per month. Location Ohio. Z-453.

PATENT DRAFTSMAN, young man who has had experience on patent drawings. Starting salary approximately $150-$175 per month. Location Ohio. Z-454.

MACHINE DESIGNERS to be used in connection with design of rubber machinery and plant equipment. Experience in design of tools, jigs, fixtures or special machinery desirable. Opportunities for advancement very good. Openings are in experimental division of engineering department. Starting salaries not to exceed $3000 per year. Location Ohio. Z-455.

TIME-STUDY MEN. Two openings in production engineering department. Technically-trained men desirable who have had some experience in time-study work. Starting salaries $185 to $225 per month. Location Ohio. Z-456.

MECHANICAL AND ELECTRICAL ENGINEER; should be technical graduate; will be required to handle office details in connection with power program. Will work in as assistant to construction engineer. Starting salary approximately $200-$250 per month. Location Ohio. Z-457.

MAINTENANCE INSPECTOR to work in connection with construction and maintenance of necessary machinery in part of industrial plant. Machine shop experience and general engineering education desirable. Starting salary approximately $175-$225 per month. Location Ohio. Z-459.

BUILDING ESTIMATOR; man 28 to 30 years old who has had estimating experience desired. Starting salary approximately $175 per month. Location Ohio. Z-460.

SAFETY INSPECTOR to be used in accident prevention and sanitation departments. Experience on machine design desirable. Should be technical graduate. Starting salary approximately $175 to $225 per month. Location Ohio. Z-461.

MACHINE-SHOP INSPECTORS; young men who have had at least two years' practical machine shop experience. Starting salaries about $125 per month. Location Ohio. Z-463.

MECHANICAL ENGINEER to assist in research work on sugar equipment, especially on forced draft blowers for power plant boiler rooms and boiler testing. Location New York City. Z-469.

MACHINE TOOL DESIGNER; experienced in engine lathes design. Must have designed machine tools of standard quality. Location New York State. Z-472.

ASSISTANT PROFESSOR OF MINING, graduate in mining engineering, practical experience, and also preferably teaching experience and who desires to remain in the teaching profession. Position opening in September 1920. Salary $2500 per year. Location Ohio. Z-474.

INSTRUCTOR IN MINING AND METALLURGY. Graduate in mining engineering with some practical experience. Salary $1600 to $1800 per year. One position open immediately and one next September. Location Ohio. Z-475.

RECENT GRADUATES OF MECHANICAL OR ELECTRICAL ENGINEERING COURSES for engineering work connected with production of electrical and mechanical devices. Send application to Mr. J. C. Wilson, the Cutler Hammer Mfg. Co., Milwaukee. State training, experience in industrial plants, if any, references and other information concerning yourself. Z-476.

DISTRICT ENGINEER to take charge of district with two residencies constructing macadam highways by Administration. Two resident engineers are already carrying on this work. In addition, in this district there is under construction a reinforced concrete wharf 700 ft. x 30 ft., over which district engineer will have direct charge, with an assistant engineer. Necessary that man should be familiar with Spanish. Salary $300 per month. House will be rented in town for office purposes in which he may live. Must agree to stay with the department for at least six months, and on this condition steamer fare to Santo Domingo will be paid. Z-477.

RESIDENT ENGINEERS with experience on highway construction and location, and in addition experienced in connection with construction and designing of sewer and water

systems for small cities with population of about 30,000. Should be familiar with Spanish. Salary $250 per month with increase to $275 within four months, provided services are satisfactory. Expenses paid when away from headquarters. Transportation from New York to Santo Domingo will be paid. Salary will commence upon the date of sailing from New York. Will be required to stay at least six months with the department, otherwise passage fare from New York to Santo Domingo will be deducted from salary. Z-478.

GROWING—PROGRESSIVE CORPORATION is prepared to develop, manufacture and market a few additional products, preferably small devices, used in electric power plant construction. Will consider adding to its staff engineer with such devices or ideas so as to assist in their development. Location Pennsylvania. Z-479.

MECHANICAL ENGINEER qualified to supervise operation of a number of Diesel stations for public utility. Generating stations are under general supervision of the power department, however, services of man to devote his entire time to inspection and general direction of Diesel operation desired. Must know maintenance and how to work out individual schedules; should be fair machinist, and must above all else have personality plus to get the respect and coöperation of the men in the field. Man who has had Diesel maintenance and erection experience with a manufacturer preferred. Good judgment and horse sense are prime requisites. Location Texas. Z-483.

SENIOR DRAFTSMAN: must be thoroughly competent and preferably have experience in designing machinery, buildings and necessary equipment commonly used in copper smelters and refineries. Salary $2500 per pear to properly qualified man. Location New Jersey. Z-484.

DRAFTSMEN WANTED FOR PANAMA CANAL—Two electrical draftsmen, one experienced in underground power distribution and building illumination and one power plant designer. Advise minimum salary will accept. One marine machinery draftsman, $208 month. Applicants must be thoroughly experienced in special lines above indicated. American citizens (final papers) under 50 years of age, in good health. Free steamship transportation from New York or New Orleans, salary beginning date of sailing. Write "Chief of Office, The Panama Canal, Washington, D. C." Z-485.

ENGINEER to study the utilization and prevention of waste material in cutting metals. Man engaged in metal stamping would have the desired experience. Location New Jersey. Z-486.

ENGINEER for the study of polishing methods and equipment. Should have knowledge of abrasives. Mechanical or chemical engineer would be best suited for this work. Location New Jersey. Z-487.

SALES ENGINEER, at least 30 years of age; preferably with experience in industrial furnaces. Position may lead to that of sales manager in U. S. territory. State age, experience, remuneration, and references. Z-488.

SALES ENGINEER, young man, graduate of technical college, to sell power-plant equipment. Sales experience not necessary; recent graduate would be considered. Work would require some supervision. To right man position would lead to an interest in the business. Territory covered between New York and Washington, headquarters in Philadelphia. Give full particulars in first letter. Z-489.

MACHINE-TOOL DESIGNER AND ENGINEER: must be first-class and have had experience along lines of high grade engine lathes. Man who has designed machine tools and can show machines in successful operation desired. Technical graduate preferred, but this is not essential. Required that applicant be well grounded in the principles of mechanics. Location New York State. Z-490.

LARGE INDUSTRIAL CONCERN wants first-class mechanical draftsman, who would also be able to do some architectural drawing. Should be an engineer, practical and able to follow up construction work if necessary. Prefer man between 25 and 36 years of age. In answering give qualifications, experience and salary wanted. Location Georgia. Z-491.

DRAFTSMAN; preferably with technical education and experience in plate and boiler construction. Experience is not necessary if applicant has mechanical education. Location Tennessee. Z-492.

PRODUCTION ENGINEER not less than 30 years of age who has an established record for producing results. Man who can demonstrate that he can get production through shop in proper manner desired. Consideration only given to letters specifying where employed during the last 10 years, name of active head of the company, and salary expected. Z-493.

COMBUSTION ENGINEER with technical steam-plant experience; one familiar with stokers and oil heating. Executive experience preferred. Location Boston and New York. Apply by letter. Z-494.

BUYER for large and growing machinery manufacturing concern in the East. Applicant must have special experience in purchasing and following up large and small castings and patterns. State full qualifications, experience, age, salary expected and give reference. Good opportunity for a man with the right qualifications. Location New Jersey. Z-496.

MECHANICAL DRAFTSMAN for position with copper-mining company. Pay will be from $200 to $230 per month, including special payment due to high price of copper. Make application in writing, stating full details regarding self and experience, and give references. Location Arizona. Z-497.

ASSISTANT PLANT ENGINEER for large tannery. Work will consist of laying out on drafting table factory power drives, and following up with direction of work as it is installed. Man capable of handling men and making himself useful as all around assistant desired. Opportunity for technical or non-technical man, providing he is live wire. Location New York State. Z-499.

FOUNDRY SUPERINTENDENT, manufacturing corporation located in central New York requires superintendent for its gray-iron foundry. Department employs about 350 men, and melts approximately 120 tons per day. Union shop. Product is mostly repetition work, light to medium; 1200 pounds maximum. Intelligent, active experienced tactful executive, may find this an attractive opening. Address stating approximate salary desired. Z-500.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month, and the form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

EXECUTIVE ENGINEER; age 39; technical graduate; open for engagement with progressive organization. Has had exceptional experience in manufacture of mechanical rubber goods and rubber insulated wires and cables. Experienced in factory lay-outs and standardization methods. Has successfully handled labor and organization problems; installed effective methods for increasing production. Eastern location preferred. SM-5100.

EMPLOYMENT MANAGER; experienced in organizing and maintaining a personnel department; understands present day employment problems and has had manufacturing and employment management experience. SM-5101.

MECHANICAL ENGINEER AND EXECUTIVE; age 31; technical and practical experience covering 15 years upon design and manufacture of special automatic machinery, machine tools, jigs, fixtures and dies, plant layout and production methods; desires opening as engineer, chief draftsman or assistant to executive in above lines. SM-5102.

GRADUATE MECHANICAL ENGINEER; five years of varied experience in lumber and steel industries. At present employed as executive in manufacturing division. Desires position which will eventually lead to manager of sales or production. Single, age 28. SM-5103.

PRODUCTION ENGINEER; age 26; married; junior member; competent to install all phases of modern production and control methods; time study, rate setting, etc.; now employed as production engineer of motor truck company. Ex-service man. Desires permanent connection with progressive concern offering attractive future. Available on 30 days' notice. Salary $3000. SM-5104.

CHIEF DRAFTSMAN; at present employed; six years' experience on tools, jigs, fixtures and dies; instruments and small automatic machinery; interchangeable parts manufacturing and modern factory layouts of production and assembly units. Would prefer connection as assistant to manager or superintendent. Position must require a hard worker. Location, New York City. SM-5105.

MECHANICAL ENGINEER; M. I. T., age 25, married. Familiar with manufacture and testing of air compressors, pneumatic tools and coal mining machinery. Over two years' at Government institution, where at present located, in aeronautic research and development work, particularly application and development of automatic mechanism. Has executive ability and has managed small instrument shop. SM-5106.

MECHANICAL ENGINEER; 15 years' experience in design, erection and operation of power plants and industrial machinery. Several years' experience in installation and operation of electric motors and high tension transmission lines. Special tracing in combustion problems. Considerable experience in handling men in executive capacity. Desires to locate with large manufacturing plant. SM-5107.

MECHANICAL ENGINEER OR EXECUTIVE; 15 years' experience along mechanical, electrical and metallurgical lines. Experience covers plant and power-house construction and maintenance, steel-making furnace construction and operation as well as steel foundry. In steel foundry from master mechanic to general superintendent. Wishes to locate in Middle West city of medium size. SM-5108.

MAINTENANCE OR PLANT ENGINEER; American, age 39; technical education; 12 years' building construction experience, divided between field and office; 5 years in mechanical lines, including power-plant, producer gas, refrigeration and maintenance. Special ability in solving plant mechanical troubles. SM-5109.

MECHANICAL ENGINEER; Cornell, 1913, desires engineering, executive or sales engineering position. Four years electrochemical manufacturing experience, as mechanical superintendent and assistant to acting general manager. Two years general smelter, concentrator and power plant design. SM-5110.

RESEARCH ENGINEER AND SHOP EXECUTIVE; technical graduate in mechanical and electrical science, with fifteen years' experience in conducting experimental work and in reduction of devices and processes to sound engineering practice. Is thoroughly familiar with manufacturing problems and economic relationship between development work and production output. Preferred location, Philadelphia or New York. SM-5111.

TECHNICAL YOUNG MAN; executive with large manufacturing firm located in New York City controlling entire quality of an internationally known article desires change, preferably as sales service engineer for suppliers in brass and copper goods. Has had shop experience and the handling of manufacturing problems, especially inspection. Five years with present concern. SM-5112.

SUPERINTENDENT OR WORKS MANAGER; with over fifteen years' experience power plant construction and operation, factory construction and concrete construction of every description; at present with U. S. S. B. as plant engineer; will go to South or Central Amer-

ica; slight knowledge of Spanish, thoroughly familiar with colored labor and conditions in South. SM-5113.

PRODUCTION ENGINEER; has worked for six years under direction of leading management engineer; desires position as management or production engineer. Location preferred, Springfield or Worcester, Mass., but will consider elsewhere. Salary $3600 per year minimum. Mechanical engineering education; member; married. SM-5114.

MECHANICAL ENGINEER; Cornell graduate; age 31; nine years' experience in power plant work, testing, inspection, combustion problems, fuels, sales and executive office work, desires position as assistant to executive or plant superintendent. Available on 30 days' notice. Location, New York or vicinity. SM-5115.

MECHANICAL ENGINEER; experienced in design, construction and production of wood and steel cars and auto truck bodies. Fourteen years' experience entire charge of operating factory. Desires position as manager of small business or factory manager of large company. Can assure results. Best of references. SM-5116.

WORKS MANAGER OR ASSISTANT; experienced in production control methods, time study and bonus work, and labor problems. At present with factory of 1000 employees. Location preferred, Middle West or South. Salary minimum $4000. SM-5117.

PLANT ENGINEER AND MANUFACTURING EXECUTIVE; technical graduate; fifteen years' general engineering and contracting experience. At present in entire charge of all construction and maintenance for very large tool manufacturing concern. Used to extensive responsibilities along these and similar lines. Particularly familiar with shipyard management and vessel repairing. Desires immediate change from unhealthful location for family's welfare. SM-5118.

MECHANICAL AND COMBUSTION ENGINEER; American, 27 years old, technical graduate, at present assistant to one of foremost steam power plant engineers in Middle West. Experience consists of design and maintenance of wire mill equipment and their boiler and power plants. Prefer location in Middle West. Salary to start to suit responsibilities. SM-5119.

SALES OR ASSISTANT PRODUCTION ENGINEER; technical graduate; four years as assistant to consulting engineers of railway power and car equipment; production planning and organization consultant for large factory, 35,000 units daily output. Anxious to represent sale of engineering specialty. Minimum salary $2600. Age 28 years. SM-5120.

POWER PLANT ENGINEER; graduate, age 34, ten years' experience in power plant estimating, design, construction and operation, also in detail design of all first-class prime movers; just returning from reconstruction work in Europe; desires position as executive or mechanical expert in established consulting engineers office. Location, immaterial, traveling no objection. Salary commensurate with responsibility. SM-5121.

ASSISTANT EXECUTIVE; age 28; married. Graduate textile engineer, has had one year experience teaching; 3 years inspecting shops for safety and two years as captain, C. A. Desires position as assistant to superintendent or manager with prospects for advancement. Location, Massachusetts. SM-5122.

ASSISTANT TO SUPERINTENDENT or Production Engineer; technical graduate in mechanical engineering, age 25; over 2 years' excellent experience in machine shop of 4000 men as assistant production engineer on ordnance and general machine shop practice. Salary $3000. SM-5123.

SUPERINTENDENT OR MANAGER; technically trained engineer in addition to being practical mechanic; 20 years' varied experience in essential and special branches; exceptional ability for getting best results from men and equipment, in established concern or working out new enterprises. Desires connection with reliable party in need of high-grade service. SM-5124.

MECHANICAL ENGINEER; technical graduate, age 25, married, desires position as assistant engineer on industrial work. Four years' experience estimating and design of plant installation, ordnance, etc. Salary $2700. Location, New York or vicinity. SM-5125.

EXECUTIVE; 32 years old, experienced in the various departments of industry, including shop management, engineering and sales. Now employed. Qualified to be works executive, office manager or district manager for manufacturer. SM-5126.

MECHANICAL ENGINEER; M. I. T. graduate; age 27; two years' experience on application and development work testing of small motors and works management engineer for manufacturing plant. At present employed. Desires to get into production and management work or position along executive lines with an industrial concern. SM-5127.

MECHANICAL AND EXPERIMENTAL ENGINEER; technical graduate; age 32; married. One year power plant experience. Two years' machine shop and instrument makers' work. Two years' experience on design, installation and maintenance of heavy cement mill and pulverized coal burning machinery. Four years' testing and experimental work on materials and machinery. One year experimental and development work on new devices and machinery. Can handle men and produce results. Location desired, Central or Western States. SM-5128.

GRADUATE MECHANICAL ENGINEER; at present head of section in mechanical engineering department of large, well-known manufacturing concern. Four years' experience covering development of improved mechanical and plant equipment and methods for manufacturing work. Work has covered both metal and wood-working departments. Thoroughly familiar with plant organization, operation and management. Chicago or Philadelphia preferred, but will consider other locations. SM-5129.

MANUFACTURERS AGENT; graduate M. E. has office on Fifth Avenue, New York City; seventeen years' broad experience in arts and requirements of construction work; steam, oil and hydro-electric power and electric railway construction and operation; recently in Army, A. E. F.; has large acquaintance among architects, engineers and contractors; seeks to represent large manufacturers of standard merchandise for Eastern territory. SM-5130.

DESIGNING ENGINEER; 8 years' experience on heavy machinery, including machine tools, rolling mills, hydraulic machinery, conveying machinery, cranes, etc.; 6 years' experience on building construction and plant layouts; 4 years as machinist. Qualified to take charge of designing force and to develop new lines; technical graduate; preferred location, central or western New York or eastern Ohio. SM-5131.

MARINE AND TECHNICAL ENGINEER; age 38, married; graduate of M. I. T., twelve years' experience in ship construction, dredging and mechanical maintenance and operation of factories and power plants as engineer, superintendent and manager. Now in marine field in executive position involving both engineering and accounting. Connection with growing concern desired. SM-5132.

HIGH GRADE EXECUTIVE; 12 years' experience. Has had complete charge of plants employing up to 6000 people. Thoroughly versed in up-to-date efficient methods of manufacturing and production. Practical engineer. Also thoroughly competent in gray iron and alloy foundry practice. Has had experience on small intricate parts as well as extremely heavy work. Ability and initiative to organize. Age 38. SM-5133.

SALES ENGINEER; wants permanent connection with reputable manufacturer of mechanical product. Willing to spend period at factory to learn product. Has five years' varied engineering and business experience and mechanical degree. American, age 28, married. Salary $3000 first year provided good prospect ahead. SM-5134.

MECHANICAL ENGINEER; technical graduate, age 31. Two years on General Electric Company apprenticeship course; one year teaching engineering subjects, two years assistant to superintendentt of inspection and one year and a half chief inspector in charge of 500 inspectors on interchangeable parts. Would like connection with some firm, preferably in central or western New York, not necessarily on inspection work. SM-5135.

DESIGNER; technical graduate University of Illinois, 1917, year and half commercial design experience specializing in original inventions and redesigns. Taking advanced degree at M. I. T. In June 1920 would like engineering work leading to engineering management or advanced research. Location, Seattle. SM-5136.

WORKS ENGINEER OR MANUFACTURING EXECUTIVE; Cornell University graduate; has had more than 10 years' experience in design, construction, operation and maintenance of large industrial plants and has been with consulting engineers and power companies; desires permanent connection in eastern United States where engineering and executive ability can be used to advantage. At present chief engineer for industrial plant in New York. SM-5137.

MECHANICAL ENGINEER; technical graduate, 1½ years' general engineering and manufacturing experience, wishes position with good manufacturing concern in west or middle west where there is oportunity for advancement. Experienced in cast data work and designing. At present employed as draftsman by firm manfacturing aerial tramways. Best references. SM-5138.

SUPERINTENDENT OR EXECUTIVE ENGINEER; technical graduate; 18 years' general engineering and practical experience in large industrial plants, as power efficiency engineer, superintendent of power plant, works engineer, mechanical superintendent and plant organization. Thoroughly familiar with plant efficiency, plant engineering, general accounting and business methods as applied to industrial plant operations. Good executive, can handle men and get results. SM-5139.

DESIGNER; technical education; 14 years' machine shop and drawing room experience, designing and constructing light and heavy machinery, intricate apparatus, fixtures and labor saving devices. Executive with initiative and good sound mechanical ideas; conversant with modern manufacturing methods, and able to handle development or experimental proposition. Age 32, married, salary $450 month. SM-5140.

MECHANICAL OR PLANT ENGINEER OR SUPERINTENDENT; age 34, technical education, 10 years' practical experience, including design, reorganization, construction, equipment, operation and maintenance, industrial and power plants, building specifications, estimates and purchases; 3 years with large dairy concern having chain of plants and creameries. Recently discharged technical officer. Employed and married. Desire permanent position with progressive company. Salary open to negotiation. Location, immaterial. SM-5141.

MECHANICAL ENGINEER OR PLANT MANAGER; thirteen years' general engineering experience on: design of special machinery; inspection of raw and finished materials; preparation of specifications; layout of manufacturing plants, marine and railroad repair shops and superintendence of construction and operation; works engineer. Eight years in charge of work of above classes. Now employed as assistant manager of manufacturing plant. Location, immaterial. SM-5142.

MANUFACTURING OR SALES EXECUTIVE; age 34; married; American. 15 years' experience, shop, construction and sales. Successful in organization of plant as well as sale of product. Resourceful and diplomatic. Prefer Automobile or Automobile Parts Company. Location U. S. or Canada. SM-5143.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER MARCH 18, 1920

BELOW is a list of candidates who have filed applications since the date of the last issue of Mechanical Engineering. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 199.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by March 18, 1920, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

California

BREED, Everett M., Engineer in Sales Department, The Pelton Water Wheel Co., San Francisco

CARLTON, Henry T., Consulting Engineer, O'Hara & Shaw, San Francisco

McCALL, Roger F., Lieutenant U. S. N., U. S. S. Nebraska, Mare Island

O'HARA, George D., Senior Partner, O'Hara & Shaw, San Francisco

SCHOLEFIELD, Crighton W., Mechanical Engineer, Efficiency Department, Standard Oil Co., Bakersfield

SMEAD, H. A., Production Engineer, Western Machinery Co., Los Angeles

SMITH, Hoxsie Y., Instructor, Troop College of Technology, Pasadena

SNYDER, Howard O., Student, Leland Stanford Junior University, Stanford University

WATTS, Charles A., Consulting Engineer, San Francisco

Colorado

ROSS, Sam L., Associate Professor, Colorado Agricultural College, Fort Collins

STROCK, Earl J., Superintendent, The Colorado Portland Cement Co., Portland

Connecticut

BUCK, Henry R., President, Ford, Buck & Sheldon, Inc., Hartford

DONOVAN, William T., Designer, Winchester Repeating Arms Co., New Haven

GUY, Robert P., Inspector of Boilers & Engines, Hartford Steam Boiler Inspection & Insurance Co., Hartford

HENRY, Addison B., Burden Distributing Clerk, Winchester Repeating Arms Co., New Haven

ROBERTSON, John D., Process Engineer, Winchester Repeating Arms Co., New Haven

SHMIED, Ernest A., Steam Boiler Inspector, Travelers Insurance Co., Hartford

SMITH, Warren P., Instructor in Mechanical Engineering, Sheffield Scientific School, New Haven

SMITH, Wells B., Head Inspection Branch, Bridgeport District Ordnance Office, Bridgeport

STOWELL, Austin L., Engineer Draftsman, Holmes Manufacturing Co., Shelton

District of Columbia

PETERSON, John B., Assistant Physicist, Bureau of Standards, Washington

Georgia

MERKEL, Arthur W., Superintendent, Continental Gin Co., Atlanta

Illinois

COLE, Benjamin E., Assistant to Vice-President, Chicago Pneumatic Tool Co., Chicago

FLEMING, Laurence T., Senior Mechanical Engineer, Interstate Commerce Commission, Bureau of Valuation, Chicago

GANNON, Jesse, Chief Enginee., The International Register Co., Chicago

HAGUE, Clark E., Sales Manager, American Steam Conveyor Corp., Chicago

HARPER, Arthur C., Associate in Machine Design, University of Illinois, Urbana

HOOVER, Howard E., Chief Engineer, Hoover Suction Sweeper Co., Chicago

KILEY, LeRoy D., Manager, Chicago Branch, Belmont Packing & Rubber Co., Chicago

LAIRD, Elmer R., Assistant Master Mechanic, Armour Glue Works, Chicago

VESELY, Joseph E., Chicago

YOUNG, Fred, Draftsman, Frost Manufacturing Co., Galesburg

Indiana

ATWELL, Oswald B., Chief Efficiency Engineer, Illinois Steel Co., Gary

LAMCOOL, Karl J., Production Engineer, Chicago, Indianapolis & Louisville Railway, LaFayette

Kansas

SCHANK, Harry E., Designing Engineer, Piersen Manufacturing Co., Topeka

Louisiana

SWANSON, Joseph L., Sales Engineer, Fairbanks, Morse & Co., New Orleans

Maryland

BOWLER, Roland T. E., Supervisor Tool Equipment, Baltimore & Ohio Railroad Co., Baltimore

JACKA, Edwin B., Superintendent Maintenance & Experimental Engineer, Red Cross Institute for the Blind, Baltimore

O'NEIL, Louis R., Chief Engineer, Maryland Pressed Steel Co., Hagerstown

SAUER, Herbert O., Assistant to Electrical Engineer, Consolidated Gas, Electric Light & Power Co., Baltimore

Massachusetts

BAILEY, George N., Assistant to Superintendent of Steam Power, New England Power Co., Worcester

BAZLEY, William H., Supervisor of Tools, Worthington Pump & Machinery Corp., Cambridge

CASEY, William R., Draftsman, McClintock & Craig, Springfield

CUMMINGS, Stanley R., Candidate for M. S. Degree, Massachusetts Institute of Technology, Cambridge

DAVIS, Frank L., Draftsman, Morgan Construction Co., Worcester

DIXON, William E., Plant Engineer, Worthington Pump & Machinery Co., Cambridge

ELLIS, Leon D., Superintendent, Sturtevant Mill Co., Boston

ENGSTROM, Karl E., Ballistic Engineer, U. S. Government, Springfield Armory, Springfield

FLEISHER, Simon, Assistant Engineer, General Electric Co., Lynn

GALAHER, Francis B., Engineering Manager, Harry M. Hope Engineering Co., Boston

GREEN, Irving, A., Planning Department Manager, The Wire Goods Co., Worcester

HAHN, Clifford A., Engineer, Stone & Webster, Boston

HART, Nelson W., Office Manager, Worthington Pump & Machinery Corp., Holyoke

JOHNSON, B. F. S., Foreman, Morgan Construction Co., Worcester

McLAUGHLIN, Carl P., The Lamson Co., Boston

MORRIS, Thomas E., Superintending Sanitary Engineer, Wyckoff & Lloyd Co., Springfield

NORTON, Edgar W., Industrial Engineer & Architect, Worcester

REYLING, George J., Mechanical Engineer, H. M. Hope Engineering Co., Boston

SEAVER, Edward, Jr., Assistant to President, Harry M. Hope Engineering Co., Boston

SVENSON, Carl L., Assistant in Mechanical Engineering, Massachusetts Institute of Technology, Cambridge

THWING, Leroy L., Valuation Engineer, Boston

WATERMAN, John H., Engineer, Charles T. Main, Boston

Michigan

CLOUGH, Bert E., Superintendent of Power, Battle Creek Sanitarium, Battle Creek

COOPER, James H., Experimental Engineer, McCord Manufacturing Co., Detroit

FLYNN, John A., President, Peninsular Machinery Co., Detroit

FOX, Milton R., Student, Assistant in Mechanical Engineering, University of Michigan, Battle Creek

GAY, Lindsley E., Superintendent of Construction & Maintenance, Lincoln Motor Co., Detroit

HVOSLEF, Fredrik W., Designing Engineer, U. S. Radiator Corp., Detroit

McKINLEY, William A., Engineer, Detroit Pressed Steel Co., Detroit

MILLER, Virgil D., Construction Engineer, Burroughs Adding Machine Co., Detroit

WRIGHT, James A., President, Wright-Fisher Engineering Co., Detroit

YODER, Howard D., Assistant Superintendent, Penberthy Injector Co., Detroit

Minnesota

ENGELKING, Walter W., Draftsman, American Hoist & Derrick Co., St. Paul

HASHAGEN, John B., Designer, Minneapolis Steel & Machine Co., Minneapolis

JOSELOWITZ, Harry A., Factory Inspector & Safety Engineer, Department of Labor, State of Minnesota, Minneapolis

SOMMER, William B., Draftsman, American Hoist & Derrick Co., St. Paul

Missouri

KUHL, Robert J., Engineering Draftsman, Monsanto Chemical Works, St. Louis

Nebraska

CLARK, McKinley F., Production Engineer, Dempster Mill Manufacturing Co., Beatrice

DEMPSTER, Clyde B., Factory Manager, Dempster Mill Manufacturing Co., Beatrice

HILDRETH, Ned E., Superintendent, Cushman Motor Works, Lincoln

New Hampshire

EMMONS, Louis J., Draftsman, U. S. Navy Yard, Portsmouth

POTTER, Robert E., Supervising Draftsman & Chargeman, U. S. Navy Yard, ..Portsmouth

SCOTT, Alexander, Superintendent of Manufacture, F. P. Lyons Iron Works, Manchester

New Jersey

ALDRICH, James F., Production Manager, National Carbon Co., Inc., Jersey City

BALCH, Samuel W., Mechanical Engineer & Solicitor of Patents, Montclair

CASTON, George W., Experimental Mechanical Engineer, E. I. duPont de Nemours & Co., Arlington

COBB, Arthur, Officer U. S. A., Chief Engineering & Maintenance Division, Picatinny Arsenal, Dover

DECKER, Edward, President, Decker Manufacturing Co., Inc., Newark

DEVRIES,, Daniel, Master Mechanic, Magor Car Corp., Passaic

DUGAN, Samuel A., Mechanical Designer, International Coal Products Corp., Newark

FRANCK, Herman, Jr., Maintenance Engineer, American Locomotive Co., Paterson

HAUCK, William L., Assistant Service Engineer, T. A. Edison, Inc., West Orange

KOPPELMAN, Morris D., Efficiency Engineering, Bijur Motor Appliance Co., Hoboken

LESLIE, Herbert, Mechanical Engineer, Standard Oil Co. of N. J., Elizabeth

SCHORLING, Henry F., Engineer, General Engineering Department, Standard Oil Co., Elizabeth

SHOUP, Samuel R., Mechanical Engineer, Davis-Watkins Dairymen's Manufacturing Co., Jersey City

STETTLER, Ray M., Mechanical Engineer, Standard Oil Co., Elizabeth

New York

ALVEN, ALFONS, Assistant Engineer, Hill & Ferguson, New York
ANSCOTT, WILLIAM, Draftsman, Sperry Gyroscope Co., Brooklyn
ATKINSON, GEORGE T., Student, Packard Commercial School, New York
BACON, CHESTER A., Chief Engineer, Brown Products Corp., Auburn
BARRETT, CHARLES D., District Engineer, Locomotive Stoker Co., New York
BICK, HAROLD N., Draftsman, Western Electric Co., New York
BRATT, RALPH T., Sales Engineer, Olney & Warrin, New York
BULL, DAVID M., Chief Engineer, Oceanic Salvage Corp., New York
BURHEN, RAYMOND, Lieutenant (Engineer Officer) U. S. N., U. S. S. Bell, New York
BURNAP, ARKELL, Secretary, Chalmers Knitting Co., Amsterdam
CASE, PERCIVAL H., Industrial Engineer, Eastman Kodak Co., Rochester
CHAPMAN, GEORGE T., Mechanical Engineer, Flaxen Fibre-Down Co., N. Tonawanda
CHASAN, LOUIS H., Chief Draftsman, Shur-Loc Elevator Safety Co., Inc., New York
CRUSER, F. VAN DYKE, Chief Chemical Engineer, The Diamond Match Co., New York
DEARBORN, RICHARD J., Patent Attorney, The Texas Co., New York
DEMAREST, STIRLING J., Machine Designer, Ford Instrument Co., New York
ELLIS, J. CORSON, Chief Engineer, John Thomson Press Co., Long Island City
HANKINS, FRANK W., Mechanical Engineer, Columbian Rope Co., Auburn
HATHAWAY, CHARLES E., Designer, Richmond Levering Engineering Corp., New York
HENDERSON, ALFRED E., Assistant Engineer, Standard Oil Co., New York
HENRY, OTTO H., Instructor in Mechanical Laboratory, Polytechnic Institute of Brooklyn, Brooklyn
HOVEY, WALTER F., Assistant Engineer, Interborough Rapid Transit Co., New York
JENSEN, SCOTT, Mechanical Engineer, G. D. Jenssen Co., New York
JORDAN, JOHN P., Vice President & Director of Operation, C. E. Knoeppel & Co., New York
KEMP, CHESTER S., Foreman, Planning Section, Watervliet Arsenal, Watervliet
LAWRENCE, CHARLES M., Tool & Methods Engineer, Sperry Gyroscope Co., Brooklyn
LEE, MAYNARD D., Industrial Engineer, Eastman Kodak Co., Rochester
LEVENTHAL, LEWIS T., Chief Engineer, U. S. S. Auk, U. S. Navy, New York
McDONALD, DONALD, General Superintendent, American Meter Co., New York
MONTESER, WALTER R., Partner, Nathan C. Solomon, New York
NEWCOMB, RAYMOND, Service Engineer, Kewanee Boiler Co., New York
RICE, CHESTER L., Associate Editor, Iron Age Publishing Co., New York
SCHOONMAKER, HERBERT S., Lawyer, Sage & Schoonmaker, New York
SHERWOOD, EDWARD L., Major, Secretary, Illuminating Engineering Society, New York
SPARLING, ERIC C., Assistant Engineer, The Sperry Gyroscope Co., Brooklyn
TSUJII, MAKOTO, Engineer, Furukawa & Co., Ltd., New York
WOLFERZ, EDWIN C., Assistant Chief Inspector, U. S. Shipping Board, New York

North Carolina

COTHRAN, JAMES S., Sales Engineer, Representing Parks-Cramer Co., Charlotte
KERR, DAVID J., Superintendent of Power, The Champion Fibre Co., Canton

Ohio

CHAMBERLAIN, GEORGE E., District Manager, Stone & Webster, Cleveland
ELLISON, MICHAEL H., Chief Civilian Inspector, U. S. A., Platt Iron Works, Dayton
FOWLER, JOHN W., Efficiency Engineer, Hays Engineering Co., Columbus
HOLZ, ROBERT, Chemical Engineer, The Richardson Co., Lockland
KELLER, CHARLES L., Assistant Operating Manager, The Richardson Co., Lockland
LUNDY, WILLIAM L., Assistant to Plant Engineer, Proctor & Gamble Co., Ivorydale
NELSON, SWEN W., Engineer, Bailey Meter Co., Cleveland
REID, NEIL K., Draftsman, Alliance Machine Co., Alliance
RICH, CLARENCE D., Mechanical Engineer, Owens Bottle Co., Toledo
STEVENSON, FRANCIS E., Chief Engineer, Hydraulic Press Manufacturing Co., Mount Gilead
VANCE, JOHN H., Superintendent of Power, The B. F. Goodrich Co., Akron

Oklahoma

BAKER, WRIGHT G., Okmulgee Producing & Refining Co., Sapulpa
SCHOENWALD, OTTO H., General Plant Superintendent, Gulf Refining Co., Tulsa
SHERMAN, ERIE W., Vice President, Sherman Machine & Iron Works, Oklahoma City

Oregon

BARNES, CLYDE E., Mechanical Engineer, Spokane, Portland & Seattle Railroad, Portland

Pennsylvania

BENJAMIN, ISRAEL, Instructor, Pennsylvania State College, State College
BRADFIELD, EDMUND S., Instructor in Engineering, Swarthmore College, Swarthmore
CROUCH, RAY C., Efficiency Engineer, Riter-Conley Manufacturing Co., Leetsdale
DACOSTA, JOHN C., 3rd, Boiler Engineer, Baldwin Locomotive Works, Philadelphia
DILLON, EDWARD H. J., Manager, Philadelphia Office, Griscom-Russell Co., Philadelphia
GERLITZKI, HARRY E., Armstrong Cork Co., Lancaster
GERSEN, FREDERICK C., Assistant Chief Draftsman, Ace Motor Corp., Philadelphia
GILBERT, CHARLES N., Mechanical Designer, Ace Motor Corp., Philadelphia
GULLAK, JOHN H., Cost Engineer, Merchant Shipbuilding Corp., Harriman
KLOTZ, EDGAR L., Mechanical Engineer, Fuller Lehigh Co., Fullerton
LASSMAN, BENJAMIN, Sales Engineer, Baker-Dunbar-Allen Co., Pittsburgh
LUKENS, WILLIAM H., Sales Engineer, Nelson Valve Co., Philadelphia
LYON, JAMES F., Representative, Brown & Sharpe Manufacturing Co., Pittsburgh
MILLS, FRANK H., Mechanical Draftsman, The Barrett Co., Frankford, Philadelphia
NASH, CARLETON B., Chief Draftsman, Maccar Truck Co., Scranton
PENMAN, WALTER R., Draftsman, Bethlehem Steel Co., Lebanon
PRICE, STEPHEN W., Mechanical Draftsman, The Barrett Co., Frankford, Philadelphia
REYES, HERMENEGILDO B., Asistant Designer & Calculator, The Philadelphia Electric Co., Philadelphia
SMITH, HARRY A., Marine Engineer, Emergency Fleet Corp., Philadelphia
WEIHE, CLYDE R., Master Mechanic, Washington Coal & Coke Co., Star Junction
WEILAND, WALTER F., Instructor, University of Pittsburgh, Pittsburgh

Rhode Island

STOVER, CHARLES C., Vice President & Engineer, What Cheer & Hope Mutual Fire Insurance Co., Providence
WEEKS, CHARLES L., Resident Engineer, Files Engineering Co., Providence

Texas

AMES, GEORGE J., General Manager, Liberty Refining Co., Cisco
BYNUM, EDWIN A., JR., Draftsman, Humble Oil & Refining Co., Cisco
HELMICK, WALTER E., Operating Engineer, U. S. Government Experiment Station, Petrolia

Washington

GREISSER, VICTOR H., Consulting Engineer, Washington Water Power Co., Spokane
LINDSAY, ALEXANDER, Superintendent Water Division, City of Spokane, Spokane
POSPISIL, LOUIS J., Chief Draftsman, Washington Water Power Co., Spokane
SALLEE, HUBERT B., Instructor of Marine Engineering, University of Washington, Seattle

Wisconsin

FYKES, MITCHELL L., Assistant Mechanical Engineer, Bucyrus Co., So. Milwaukee
KRAFT, John F., Assistant to Factory Manager, A. O. Smith Corp., Milwaukee
STUCKERT, FELIX J., Chief Draftsman, Briggs & Stratton Co., Milwaukee
WELSER, G. BRINTON, JR., Assistant Secretary, Chain Belt Co., Milwaukee

Canada

KEITH, GORDON C., Editor, The Canadian Manufacturer, Toronto

Brazil

SYLVAIN, CHARLES E. B., Textile Engineer, International Machinery Co., Rio de Janeiro

England

ROSS, ARCHIBALD C., Managing Director, Messrs. R. & W. Hawthorn, Leslie & Co., Ltd., Newcastle-on-Tyne

Russia

VINOGRADOFF, DEMETRY I., Assistant Professor, Moskow Institute of Technology, Moskow

West Indies

SCHARNBERG, HERMAN J. B., Chief Mechanical & Electrical Engineer, Haitian American Corp., Port au Prince, Haiti

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE-MEMBER

New York

TRAUDT, WILLIAM F., Vice President & General Manager, Taber Pump Co., Buffalo

Pennsylvania

MEHARG, LAURENCE, Power Engineer, Hazel Atlas Glass Co., Washington

Rhode Island

BRIGGS, LEROY E., Production Engineer, Gorham Manufacturing Co., Providence

PROMOTION FROM JUNIOR

Arizona

ROGERS, EDWIN A., Chief Engineer of Power Plant, New Cornelia Copper Co., Ajo

Connecticut

HERRICK, EDSON P., Factory Accountant & Assistant Production Manager, Colt's Fire Arms Co., Hartford
THOMAS, RAYMOND H., Draftsman, Birmingham Iron Foundry, Derby

New Jersey

ESHERICK, GEORGE, JR., Fuel Engineer, International Coal Corp., Newark

Pennsylvania

CHANCE, THOMAS M., Member of Firm, H. M. Chance & Co., Philadelphia
WIESE, OSCAR H., Engineer, Emergency Fleet Corp., Philadelphia

SUMMARY

New Applications	190
Applications for change of grading:	
Promotion from Associate-Member	3
Promotion from Junior	6
Total	199

SUMMARY SHOWING AVERAGE AGE AND POSITIONS OF APPLICANTS ON BALLOT CLOSING FEBRUARY 25, 1920

Average age of applicants:	
Members	46
Associates	36
Associate-Members	31
Juniors	24
Captain	1
Chief Engineer	11
Consulting Engineers	6
Constructing Engineer	1
Designers	9
Designing Engineers	3
Aero Draftsman	1
Draftsmen	4
Chief Draftsmen	5
Mechanical Draftsmen	3
Engineers	12
Efficiency Engineers	2
Erecting Engineer	1
Electrical Engineer	1
Executives (Pres., Vice-Pres., Secy., Treas., Mgrs.)	20
General Manager	1
Inspector	1
Master Mechanics	2
Mechanical Engineers	13
Asst. Mechanical Engineers	3
Plant Engineers	2
Professors	4
Sales Engineers	8
Sales Managers	3
Service Engineer	1
Superintendents	9
Supervising Engineer	1
Asst. Superintendents	6
Test Engineer	1
Supervisor	1
Miscellaneous	54

In Two Sections—Section Two

Volume 42 Number 4

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

APRIL 1920

A. S. M. E. Affairs

PUBLISHED MONTHLY BY THE SOCIETY
29 WEST 39TH STREET, NEW YORK, U.S.A.

Coming Section Meetings

Baltimore Section. April: Date to be announced later. Arrangements are being made to have Dean John R. Allen, U. S. Bureau of Mines, Pittsburgh, Pa., address this meeting.

Birmingham Section. April 23 or 26: Definite date to be announced. Joint meeting with Atlanta Section, in Birmingham. Speaker, Dean John R. Allen.

Buffalo Section. April 5: At the Ellicott Club, 10th Floor, Ellicott Square Bldg., at 8:15 p. m. Subject: Contamination of the Niagara River, by Harrison P. Eddy, of Boston, Mass., consulting engineer for the City of Buffalo in connection with the Scajaquada Creek flood-abatement and sewage-disposal work.

Cleveland Section. April 27: At the Hotel Statler, in the Cleveland Engineering Society's rooms. Speaker to be announced.

Meriden Branch. April 8: At the Home Club at 8:00 p. m. Subject: Boiler Feeding, by Stanley Brown, Griscom-Russell Co., New York. Lecture to be illustrated with lantern slides. He will also describe evaporators for supplying distilled water for boiler feed.

New Haven Branch. April 16: In the Mason Laboratory of the Sheffield Scientific School, at 8:00 p. m. Subject: Research. Address by Arthur M. Greene, Jr., Chairman of the Research Committee, A. S. M. E. Entire Connecticut Section including Hartford, Meriden, Bridgeport and Waterbury Branches, is invited to attend this meeting.

Indianapolis Section. Every-Thursday Luncheon Meeting at the Scientech Club.

New York Section. April 13: Symposium on Welding. Mr. Adams to be asked to arrange this meeting as a joint meeting between the Welding Society and the A. S. M. E.

Mid-Continent Section. April 29: At the Chamber of Commerce, Tulsa, Okla. Joint meeting with Oklahoma Section of American Chemical Society. Details to be announced.

Philadelphia Section. April 27: At the Engineers' Club. Subject: Modern Practice in the Manufacture of Steel, by Col. W. P. Barba, of Philadelphia, Pa.

St. Louis Section. April 7: At the Hotel Statler. Joint meeting of the Associated Engineering Societies of St. Louis. Subject: Different Processes in the Manufacture of a Heine Boiler, by F. O. Pahlmeyer, Engineer Heine Safety Boiler Co. (Published as being held last month in error.)

April 30: At the Hotel Statler. Subject: Development in Chain-Grate Stokers, by H. P. Gauss, Engineer, Illinois Stoker Co.

San Francisco Section. April 8: At the San Francisco Engineers' Club. Subject: Turbine Reduction Gear for Ship Propulsion, by W. J. Davis, of the General Electric Co. Lecture to be illustrated with slides. Visit to Dersel Power Plant later.

Every Thursday at the San Francisco Engineers' Club, luncheon meeting.

Spring Meeting, St. Louis, May 24-27

A Tentative Program and full particulars of the Spring Meeting will be found on 60 page of this Section. Plans are also being made for an excursion.

EN ROUTE TO SPRING MEETING

Visit of A. S. M. E. to Keokuk—May 23d, 1920

The hydroelectric installation at Keokuk will be inspected on May 23d upon the invitation of the Mississippi River Power Company. Views of this famous engineering development appear elsewhere in this issue. Those planning to attend the Spring Meeting may take advantage of this opportunity to visit Keokuk without the loss of time from business, as the inspection will be made on a Sunday.

Arrangements are being negotiated to have special Pullman cars on the train which will leave Chicago via C., B. & Q. R. R. at 11.00 p. m., Saturday, May 22d, and arrive in Keokuk at 9.00 o'clock Sunday morning. The arrangements also contemplate having the sleeping cars lay over at Keokuk and leave Sunday night, so as to arrive in St. Louis Monday about 7.00 a. m.

In order to make arrangements ahead with the Hotel Iowa regarding meals, and provide a sufficient number of Pullman accommodations out of Chicago, members are requested to send in the attached slip at once in order that an estimate may be made.

- -

A. S. M. E., 29 West 39th St., New York.

Without obligating myself I am furnishing the following information to enable plans for an excursion en route to the Spring Meeting to be developed:

I expect to attend with { ....lady / ....gentleman } guests, and will require { ....upper berth....section / ....lower berth....drawing room }

in Pullman sleepers from Chicago via Keokuk, Ia., to St. Louis, Mo.

I { will / will not } attend Spring Meeting at St. Louis, but will go direct to St. Louis. I would like to

go with the .... Section, if it arranges for a special party.

Name ....

Address .... City ....

SOCIETY AFFAIRS

Secretary's Letter—Nominating Committee Invites Suggestions—The Spring Meeting at St. Louis—Council Guests of Baltimore Section—U. E. S. Treasurer's Report—Section Meetings—Necrology—Personals—Employment Bulletin—Candidates for Membership

Character is Power

Secretary's Letter

I HAVE already called attention in these columns to the movement in the engineering profession to assume greater responsibility in civic affairs. All the reports of the Committees on Development of the National Societies, as well as the report of the Joint Conference Committee of the Founders Societies, recommend this.

The assumption of this responsibility cannot fail to reflect back on the engineer and develop his character. A number of years ago, at a Senate hearing, Mr. J. Pierpont Morgan, Sr., made a statement to the effect that in the final analysis character is the basis of all dealings, and that it is even the foundation of Wall Street, which was in a certain sense a surprise to some, who had pictures in their minds of some other mysterious power that ruled the financial center of the United States. Upon analysis, however, Mr. Morgan's statement appealed to every one as being very human and true.

A significant statement in the report of the Joint Conference Committee is: "The Committee believes that all efforts toward bringing a united profession to the service of the Nation, the State and the City will bring to its members the public honor, esteem and *recognition* which their qualifications deserve, now relatively unacknowledged and uncompensated."

Under the present world conditions we should expect considerable emphasis to be placed on the economic phases of life, and I find in carrying out the Secretary's duties in visiting the Local Sections, and similarly from the impression obtained by a member of the Council who has just returned from visits to all our Sections in the northern and western states, that past conditions of compensation of engineers have made this problem in many cases acute.

The "uncompensated" recognition, etc., as it is called in the Joint Conference Committee's report, is just now influencing great numbers of the younger members of the engineering profession. In the West, particularly, there is a great disparity between the salaries of professional men in responsible positions and the wages paid to mechanics in comparatively lower grades of responsibility and personal attainment. In a typical case that I recall, a superintendent of motive power of a western section of a transcontinental railroad was receiving a salary of $3000, while his yard switchmen and other men under him received from $3500 to $4500 in wages in their pay envelopes.

In dealing with such situations, which are accentuated by the general chaotic conditions throughout the world, steadiness and optimism must be the unfailing guides of the professional engineer if he is finally to emerge as deserving of "public honor, esteem and recognition." And here is where the character of the engineer comes in.

There is great pressure being exerted, particularly by the younger men, whom we are striving to assist and in whom we try to show very definite interest, to the end that attention be given to the economic situation. The National Societies have responded through Engineering Council by the appointment of committees on classification and scales of compensation. These committees have worked with faithfulness and wisdom, and to the Secretary's positive knowledge their reports have been of direct benefit.

The advice to all is that they should have confidence that these temporary inequalities will be corrected, and that the professional man should not "sell his birthright for a mess of pottage."

Even at the risk of being considered too idealistic, I want to quote from an address of John Bell Keeble before the Annual Meeting of the American Institute of Architects in Nashville last year: "The professional man ought to feel that whatever he knows and whatever he has acquired in his profession is not merely for the gratification of his intellectual appetite, not merely for the satisfaction of the possession of knowledge, but that he holds this knowledge and skill in trust for all."

As the Secretary is writing this letter, the whole German nation is reported to be in an upheaval. Should we, as a profession, have less courage than the German people? Are not the economic conditions of the average citizen of Germany and the average citizen of Russia and other distracted countries inconceivably worse than those of the engineering profession of the United States? Should we not, therefore, have a steadiness of purpose and determination to maintain our professional ideals and our loyalty to the National Societies of our profession?

CALVIN W. RICE,
Secretary.

Nominating Committee Invites Suggestions

The Regular Nominating Committee for 1920 invites suggestions from the membership of names of men to fill the following vacancies in the offices of the Society, which will occur in December next, and recommendations for which must be reported by the Committee to the Society at the Spring Meeting in May:

PRESIDENT, to serve one year.
THREE VICE-PRESIDENTS, to serve two years.
THREE MANAGERS, to serve three years.
TREASURER, to serve one year.

Suggestions should be received by May 1. They may be sent to the Secretary of the Society, at 29 West 39th Street, New York, or to the secretary of the Nominating Committee, Prof. H. P. Fairfield, Worcester Polytechnic Institute, Worcester, Mass., or if preferred, to the group representatives of the Nominating Committee, who were listed in the January issue of MECHANICAL ENGINEERING, Section 2, p. 11, and whose addresses are reproduced below:

GROUP SECTIONS AND NOMINATING COMMITTEE 1920

1 Boston, Worcester, Connecticut, Philadelphia, Baltimore, Eastern N. Y.
H. P. Fairfield, Worcester Polytechnic Inst., Worcester

2 New York (Metropolitan Sec.)
George K. Parsons, 29 Pine St., New York City

3 Washington, D. C., Virginia, Atlanta, Birmingham, New Orleans
Geo. A. Weschler, Catholic Univ. of America, Washington, D. C.

4 Rochester, Buffalo, Toronto (Ont.), Cleveland, Erie
E. H. Whitlock, 910 Am. Trust Bldg., Cleveland, Ohio

5 Milwaukee, Chicago, Indianapolis, Cincinnati, Detroit
Geo. W. Galbraith, 1504 First Nat'l Bank Bldg., Cincinnati, Ohio

6 St. Paul Minneapolis (Minnesota Sec.), St. Louis, Mid-Continent, Colorado, Houston
C. B. Lord, 5575 Chamberlain Ave., St. Louis

7 Los Angeles, San Francisco, Oregon, Washington State
Robert Sibley, 171 Second St., San Francisco, Cal.

Spring Meeting at St. Louis

Papers of a High Order of Merit to Be Presented—Local Committee Actively at Work on Entertainment Program—Members and Friends Assured of an Enthusiastic Reception

THERE is published herewith a tentative program for the Spring Meeting to be held at St. Louis, May 24 to 27, beginning with Monday of the week of the convention instead of Tuesday as has usually been the case. Plans are being completed whereby a visit may be made to the famous water-power development on the Mississippi River at Keokuk, en route to the meeting at St. Louis, particulars of which are given on page 2 of this section of MECHANICAL ENGINEERING. In Section 1 of this number, also, will be found a description and illustrations of the Keokuk hydroelectric plant which will prove of interest to all who may wish to take advantage of the opportunity to join the main party leaving Chicago by the C., B. & Q. R. R., 11:00 p.m., Saturday, May 22.

The Committee on Meetings and Program has arranged for a group of papers comprising subjects not only of interest locally to those in the Mississippi Valley, but of broad general interest, and in a variety of fields running from foundry practice to aeronautics. The Local Committee at St. Louis, also, has been actively at work completing its program for entertainment, which has every promise of being one of the most attractive that has ever been offered to the Society.

St. Louis not only has a number of industrial plants that are well worth inspection by engineers, but a municipal water plant and power plants which in many respects are unique. This city, through the efforts of its progressive citizens and the Chamber of Commerce—one of the leading organizations of the kind in the country—has developed places of amusement and entertainment, such as the very unusual open-air theater in Forest Park, and meeting places for large assemblies, which contribute greatly to the resources of the city for the entertainment of guests. The geographical location of the city is such that there should be a large attendance of the membership, not only from the East, from where the larger number usually come for such a meeting, but from the Middle West and South, and even from distant western points.

The meeting will give an unusual opportunity for the frequenters of the conventions of our Society to meet many of the members in other sections, and thus extend their acquaintance and enable them to come in contact with those in diversified lines of industry, representative of the different sections of the country. It will be a meeting where hospitality will reign supreme, and a cordial welcome, unsurpassed by that of any previous convention, will surely be extended.

The ladies attending the meeting will join with the members in many of the enjoyable entertainment features and there will also be special entertainment for them, arranged by the Ladies' Committee, such as an automobile trip to Forest Park and a visit to the Art Museum in the Park, including a trip through the residence section. Some time will also be spent in the shopping and business district.

TENTATIVE PROGRAM, SPRING MEETING

St. Louis, May 24-27; Headquarters, Hotel Statler

MONDAY, MAY 24

Afternoon:

Registration, Council Meeting, Committee Meetings.

Evening:

Reception, with addresses by the Governor of Missouri and the Mayor of St. Louis.

TUESDAY, MAY 25

Morning:

Business Meeting, followed by session with papers of local interest on Mississippi River Transportation and on Housing.

Afternoon:

Excursions. A trip is contemplated to the plants of the Commonwealth Steel Company, the Union Electric Light and Power Company and the St. Louis Boat and Engineering Company. At the latter plant, Mississippi River steel barges are under construction.

Evening:

Banquet and addresses. Either on this occasion or at some other time, to be determined, lantern slides and moving pictures will be shown of the formidable German fortifications on the coast of Belgium, by Lieut.-Colonel H. W. Miller, U. S. A.; and of the remarkable transcontinental motor convoy trip made in this country by the U. S. Army, by Lieut. E. R. Jackson, U. S. A.

WEDNESDAY, MAY 26

Morning:

Simultaneous Sessions on Aeronautics and Foundry Practice, with papers on the following subjects:

Aeronautic Session; Air Flow Past an Airplane Wing; Use of Turbo-Compressors for Increasing Power of Airplanes at High Altitudes; Airplane Instruments; Experiments on New Type of Airplane. It is expected that moving pictures will be shown.

Foundry Session: Malleable Castings; Die Castings; Gray-Iron Castings; Aluminum Castings; Steel Castings; Brass and Bronze Castings.

Afternoon:

Session on Appraisal and Valuation, with discussion of the following subjects: Appraisal and Valuation Methods; Fundamental Principles of Rational Valuation; Data on the Cost of Organizing and Financing a Public-Utility Project; the Construction Period; Price Levels in Relation to Value.

Excursions to various industrial plants of interest, including Busch-Sulzer Diesel Engine Company, Mississippi Valley Iron Company and the new Bevo Plant.

Evening:

Plans are under way for a special entertainment at the unique municipal open-air theater at Forest Park.

THURSDAY, MAY 27

Morning:

Simultaneous Sessions with papers on the following topics: Weir for Gaging the Flow of Water in Open Channels; Simplification of Venturi-Meter Calculations; Flow of Air; Dissipation of Heat by Various Surfaces; Pulverized Coal at the Cerro de Pasco Copper Corporation; Method for Separation of Dissolved Gases from Water and Some of Its Uses; Flow of Air Through Small Brass Tubes.

Afternoon:

There will probably be a boat trip on the river, with a landing at the Chain of Rocks to inspect the filtering basins and pumping plant of the city.

Council Guests of Baltimore Section

Endorses Local Sections Expansion—Confirms Special Committee on Professional Sections—Explains Society's Position on Metric System

The Council spent two days as the guests of the Baltimore Local Section on February 27 and 28. On the first day the Council held its regular monthly meeting at the Hotel Emerson, Baltimore, and on the second day the members of the Council were the guests of the U. S. Naval Academy of Annapolis.

The following members were present: President, Fred J. Miller; Vice-Presidents, F. R. Low, J. R. Allen, R. H. Fernald; Past-Presidents, Charles T. Main, Ira N. Hollis; Managers, L. E. Strothman, D. Robert Yarnall, C. L. Newcomb, C. Russ Richards, F. O. Wells, E. C. Fisher, E. F. Scott; Chairmen of Standing Committees, Publications, Geo. A. Orrok; Local Sections, E. S. Carman; Secretary, Calvin W. Rice.

Local Sections. The petition for the formation of a section of the Society at Toledo, Ohio, was approved.

The Committee on Local Sections, through its Chairman, E. S. Carman, reported on the financial status of that Committee's appropriations and stated that if the present rate of activity were to be maintained, additional funds were needed. The Council voted that if the Finance Committee finds that the current income of the Society will not provide for the maintenance of this rate of activity, the Council would look with favor on a transfer of funds from Reserve Account for the work of the Committee on Local Sections.

Increase of Membership. The Council favored crediting to the Committee on Local Sections 25 per cent of the initiation fee of each new member secured by a Local Section, the Section to receive 20 per cent and the Committee 5 per cent.

Professional Sections. The Council approved the appointment by the President of the following special Committee on Professional Sections to function until the creation of a Standing Committee on Professional Sections expected by vote of the membership at the Spring Meeting in May, the President's appointments being as follows:

Name	*Address*	*Representing Professional Section on*
Howard F. Coffin	Detroit	Aeronautics
Frederick W. Kelley	Albany	Cement
David Moffat Myers	New York	Fuel
Geo. A. Orrok	New York	Gas Power
L. P. Alford	New York	Industrial Engineering
C. F. Hirshfeld	Detroit	Ordnance
R. H. Fernald	Philadelphia	Power
E. W. Thomas	Lowell	Textiles
E. B. Katte (Temporary Chairman)	New York	Railroads
To be appointed		Machine-Shop Practice

Boiler Code Committee. The Council approved the appointment of J. H. McNeill as a member of the Sub-committee on Rules for Inspection of the Boiler Code Committee. The Boiler Code Committee asked that the Council refer to the appropriate committee, their request for a report on the "sudden initial pop lift" of safety valves, and the matter was referred to the Research Committee.

Relations with Colleges. Petitions for Student Branches at Alabama Polytechnic Institute and at Drexel Institute were approved.

Protection of Industrial Workers. The Council authorized the preliminary printing of the Elevator Code for distribution and discussion at the Spring Meeting and extended a vote of thanks to the Committee for their four years of painstaking work.

International Pipe Threads. The Society's delegates to the International Conference on Pipe Threads have returned from Paris and reported that the Conference has been postponed for one year. The Council voted its thanks to Laurence V. Benét, the Society's representative in Paris, for his unfailing courtesy, interest and devotion to the Society and its delegates.

Engineering Council. On the recommendation of the Joint Finance Committee of the Founder Societies, the Council voted to increase the appropriation to Engineering Council for the year 1920 from $3000 to $5000.

Société des Ingénieurs Civils de France. The President read a letter from the Société des Ingénieurs Civils de France, as follows:

Mr. President:

We have been advised that your Society expects, shortly, together with other similar societies, to take up the question of the metric system and of its adoption in the United States.

I take the liberty of sending you, herewith, the text of a resolution which our Council has adopted, with the request that you kindly bring the same to the attention of your Council.

We hope that the explanations which it contains, added to those which Mr. Guillaume had the honor of making before a certain number of your delegates, will show how useful it would be to the engineers of all countries to have the metric system adopted.

Please accept, Mr. President, the expression of my most distinguished regards,

(Signed) S. Gruner, *President.*

Text of Resolution

The Society of Civil Engineers of France, in sending fraternal greetings to The American Society of Mechanical Engineers, desires to draw the attention of its Council of direction and of its Members to the immense advantages which would result from the obligatory adoption of the Metric System by the great American Union.

If the Society of Civil Engineers of France feels that it ought to take this initiative now, it is because it has been informed of the existence in America of activities calculated to mislead public opinion which, if successful, would result in depriving their American colleagues of the advantages of which they themselves realize the value every day.

This also because, in the year 1903, during which similar activities originating from the same source had already been noted, the American Chamber of Commerce of Paris had applied in full confidence to the Society of Civil Engineers of France for information placing it in condition to know the truth.

The following reply was approved by the Council:

The President,
Société des Ingénieurs Civils de France,
Paris, France.

Mr. President:

In accordance with your request, I have had the honor to present to the Council of The American Society of Mechanical Engineers, the Resolution adopted by La Société des Ingénieurs Civils de France.

It cannot be said that The American Society of Mechanical Engineers has, at present, any intention to consider the question of the adoption of the Metric System in the United States.

Upon former occasions our Society has considered and its members have fully discussed the relative merits of our present system and of the Metric System. This discussion and the balloting have shown our members to be divided upon the matter. Though it is probable that a considerable proportion of our members would favor the taking of steps toward the use of the Metric System, where such steps can be taken without sacrificing the interests of those who take these steps, the prevalent sentiment is still strongly against the compulsory adoption of the system, and if sentiment in favor of its adoption increases it will be only as a result of much effort by the friends of the system.

The Council of The American Society of Mechanical Engineers by a resolution unanimously adopted, authorizes me to express to you its highest appreciation of your offer of help in the solution of an important and difficult problem, and to express the hope that if and as this problem continues to present itself before us we shall be able to look to your society for help, and especially for information based upon the actual experience of your membership.

Please accept, Mr. President, the expression of our most distinguished regards.

Fred J. Miller, *President,*

Approved by resolution of the Council, February 27, 1920.

Calvin W. Rice, *Secretary.*

Nolan Bill on Patents. The appointment of the following Committee to appear before the Rules Committee of the Senate and urge the passage of the Nolan Bill to ameliorate conditions in the Patent Office was approved: James Hartness, W. F. M. Goss, E. M. Herr, Henry Hess, Geo. M. Bond, A. M. Hunt, Spencer Miller, George Gibbs, F. J. Cole, Charles Whiting Baker and Charles T. Main.

Industrial Unrest Pamphlet. The President reported that he and other members of the Society had received a pamphlet entitled Industrial Unrest, written and distributed anonymously but bearing the seal of the Society without the Society's permission or knowledge. The Council voted that the use of the Society's

emblem is unauthorized, except by permission of the Council or by rules established by it. It strongly disapproved of any unauthorized use of the emblem of the Society, printed or otherwise, and instructed the President to write a letter to the person responsible for the writing and sending out of the pamphlet, censuring him for using the emblem.

The President and Secretary were also instructed to ascertain who was responsible for the statements supposed to represent the Society on this question and call his attention to the fact that the Society has taken no such action on the statements and to refrain from such propaganda.

The Council authorized the President to appoint a Committee to formulate and report back to the Council, rules for the use of the Society's emblem.

Calvin W. Rice,
Secretary.

U. E. S. Treasurer's Report for 1919

Showing the Prosperous Financial Condition of the Organization Owning the Engineering Societies Building and Equipment

In the March issue of Mechanical Engineering, Section Two, page 41, there was published a brief report of the activities of the United Engineering Society for the year 1919 which was issued by the retiring president, Charles F. Rand. Below is appended the report of the treasurer, Joseph Struthers, for the calendar year 1919.

Treasurer's Report for Calendar Year 1919

The Surplus Account on December 31, 1918, showed a balance of $5,533.43. This amount has been increased by the surplus from the operating accounts during the year of $9,557.28, making a total on December 31, 1919, of $15,090.71. Of this amount $10,000.00 has been transferred to Depreciation and Renewal Fund, leaving a balance in Surplus Account of $5,090.71.

The *Gross Operating Expenses* for the year 1919 were $66,812.89, as compared with $66,505.57 for the year 1918, an increase of $307.32.

The funds available for the *Library Board*, and spent under its direction during the year, amounted to $23,876.64.

The funds available for Engineering Council during the year, amounted to $49,012.38, of which $940.07 remained unexpended.

The *General Reserve Fund* of $10,000 created by the Board of Trustees at a meeting held November 18, 1914, to be available to take care of unforeseen fluctuations of income and outlay, has been preserved intact, there arising no calls on this fund during the year 1919.

The *Depreciation and Renewal Fund* at the beginning of the year 1919 amounted to $86,163.78. During the year this fund has been increased by the sum of $4,035.22 for interest earned by the investments for this fund and by $10,000.00 added from the surplus at the end of the year, making a total of $100,199.00 on December 31, 1919.

In accordance with the authorization of the Board of Trustees, Feb. 27, 1919, the sum of $13,000.00 was invested in Government of United Kingdom of Great Britain and Ireland, 20 year bonds, 5½'s due Feb. 1937, $5000 being reinvestment of proceeds from Bethlehem Steel Co. 2 year Sec. Gold Notes matured Feb. 15, 1919, and $8,000 cash transferred from Surplus to Depreciation and Renewal Fund.

The following summary shows the amounts of the funds held by U. E. S. as of Dec. 31, 1919.

Depreciation and Renewal Fund December 31, 1918	$86,163.78
Interest on invested funds during the year 1919	4,035.22
Transfer for the year 1919	10,000.00
Total	$100,199.00
General Reserve Fund	10,000.00
Engineering Foundation Fund	303,374.80
Library Endowment Fund	102,559.70
Total	$516,133.50

Treasurer's Receipts and Payments, Year of 1919

RECEIPTS

Cash on hand January 1, 1919			$12,869.60
From Founder and Associate societies:			
For office, storage, halls, telephone, & Misc.	$76,984.08		
From Societies not in building,			
For Halls	5,727.70		
For Miscellaneous	658.57		
For Library		15,737.42	
For Library Service Bureau		17,740.65	
For Library Recataloging		5,624.99	
For Engineering Council		46,958.91	
Interest collected on Bonds and Deposits		9,640.75	
Interest collected on Engineering Foundation Bonds		15,324.24	
Maturing of $5000. Bethlehem Steel Corp. Bonds		5,000.00	
From A. I. M. E. for Building addition		2,500.00	
From A. I. E. E. for Building addition		2,500.00	
			204,397.31
Grand Total			$217,266.91

PAYMENTS

To Engineering Foundation.		
Income from investments, less collection charges	15,331.74	
For Govt. of Great Britain & Ireland Bonds purchased	13,169.72	
For Building Operating Expenses	75,350.56	
For Library	24,209.99	
For Library Service Bureau	17,459.33	
For Library Recataloging	4,361.31	
For Engineering Council	49,630.48	
For A. S. M. E. Notes	5,000.00	
For A. S. M. E. Interest on Notes	108.49	
For Collect charges and exchanges	108.11	
Total Payments		204,729.73
Cash on hand Dec. 31, 1919		12,537.18
Grand Total		$217,266.91

Assets and Liabilities
December 31, 1919

ASSETS

Real Estate	$1,947,171.16	
Investments—Foundation	303,321.25	
Library	102,297.50	
General	93,894.72	
Cash	12,637.18	
Accrued Interest Receivable	2,806.88	
Bills Receivable	7,500.00	
Accounts Receivable	8,742.43	
Advances to Library Board	2,602.36	
		$2,480,973.48

LIABILITIES

Founders Equity in Property	$1,947,171.16	
Due to General Reserve Fund	10,000.00	
Due to Depreciation and Renewal Fund	100,199.00	
Due to Eng. Foundation Fund	303,374.80	
Due to Library Endowment	102,559.70	
Bills Payable	7,500.00	
Library cataloging unexpended balance	1,472.01	
Library Service Bureau unexpended balance	2,666.03	
Engineering Council unexpended balance	940.07	
Surplus December 31, 1919	5,090.71	
		$2,480,973.48

Respectfully submitted,
Joseph Struthers,
Treasurer.

Section Meetings

Atlanta:

March 23. Ball Bearings Applied to General Power Transmission, by W. H. Holby.

Baltimore:

February 27-28. Council Meeting with Baltimore Section. The Baltimore Section held a meeting of unusual interest on February 27 on the subject of Vocational Training. The Council, which held its regular meeting in Baltimore earlier in the day, attended in a body and the Mayor of Baltimore and the Members of the School Board were also present. The Vocational System employed in York, Pa., was described by A. E. Warner, Superintendent of the Public School System of York. President Miller and Dr. Hollis also spoke, the latter pointing out the need for the establishment of Vocational Training in some form throughout the entire school system of the United States. He stated that the country has now arrived at the operative period in our history after having passed through the constructive stage and we must devise methods to make the work of this industrial nation interesting to every worker, a process best accomplished by Vocational Training.

The meeting was held in the auditorium of the Engineers' Club of Baltimore and was preceded by a dinner at the Hotel Emerson. The following morning the Council, together with the members of the Baltimore, Philadelphia, and Washington Sections of the Society, visited the Academy at Annapolis upon the invitation of Rear-Admiral A. H. Scales, Superintendent of the Academy, and the U. S. Naval Experiment Station upon the invitation of Admiral Kincaid. A feature of this visit was the informal luncheon served at Carvel Hall, Annapolis.

March 3. Reinforced-Concrete Design and Construction, Past and Present, by Ernest P. Goodrich, Consulting Engineer, New York City.

March 10. Railroad Grade-Crossing Elimination, by Samuel T. Wagner, Chief Engineer, Philadelphia and Reading Railroad, Philadelphia, Pa.

March 17. The Commercial Side of Engineering, by Commander Walter M. McFarland, Manager, Marine Department, Babcock & Wilcox Co., New York City.

March 24. Engineering and Construction Organization for Rapid Work, by I. W. McConnell, Vice-President, Dwight P. Robinson & Co., New York City. These lectures were given in connection with the J. E. Aldred course on engineering practice, at Johns Hopkins University.

BOSTON:

February 24. Joint meeting of Boston Section of the A. S. M. E., Boston Society of Civil Engineers, and Boston Section of A. I. E. E. A National Department of Public Works, by Professor George F. Swain, School of Engineering, Harvard University.

March 30. Eleventh Annual Dinner of the Engineers of Boston, sponsored by the Boston Sections of the A. S. M. E., A. I. E. E., and the Boston Society of Civil Engineers. Some Economic Aspects of the Treaty of Paris, by Paul Cravath, an attorney of New York City. Social Engineering by Dean Roscoe C. Pound, Harvard Law School.

CHICAGO:

March 4: Joint meeting A. I. E. E., Electrical Section W. S. E., Mechanical Section W. S. E., A. S. M. E., and Western Railway Club. S. T. Dodd, General Electric Co., Schenectady, N. Y., on Some Comments on the Present Status of Steam Railroad Electrification.

March 19. Dinner Meeting of A. S. M. E.

COLORADO:

March 26. Colorado's Development and the Engineer, by Professor L. D. Crain, State Agricultural College, Fort Collins, Col.

CONNECTICUT:

HARTFORD BRANCH:

March 15. Power Production, by George A. Orrok, Construction Engineer, New York City.

NEW HAVEN BRANCH:

March 8. Joint meeting of New Haven Branch of A. S. M. E. with Winchester Engineering Club; Supper Meeting of A. S. M. E. members. Addresses during the luncheon by Professor Wohlenberg on Research, and by Professors Breckenridge and Scott on Coöperation of the Engineering Societies. Evening Meeting: Measuring and Manufacturing to the Millionth of an Inch, by W. H. Weingar, of the Pratt & Whitney Co., Hartford, Conn.

DETROIT:

February 20. Joint meeting of A. I. E. E., A. S. M. E., and Detroit Engineering Society. Spectacular Illumination, by W. D'Arcy Ryan, Director, Illuminating Engineering Laboratory of the General Electric Co., Schenectady, N. Y.

NEW YORK:

February 19. Joint Meeting of A. S. C. E., A. I. M. E., A. I. E. E., A. S. M. E. A National Department of Public Works, by M. O. Leighton.

March 9. Symposium on The Application of Heat in Industrial Processes, Joseph A. Doyle, New York City, presiding.

PHILADELPHIA:

March 23. Safeguards in Industrial Plants, by L. A. de Blois, Safety Engineer, du Pont de Nemours & Co.

SAN FRANCISCO:

March 11. The American Plan of Industrial Relations, by Minor Chipman, Council on Industrial Relations for California Metal Trades Association.

WASHINGTON STATE:

March 1. Subject of Particular Interest to Engineers in Connection with the Present Industrial Situation, by Stephen I. Miller, Dean of the College of Business Administration, University of Washington.

WORCESTER:

March. A Trip Through the Bureau of Standards, Washington, D. C., by Dr. S. W. Stratton.

PERSONALS

In these columns are inserted items concerning members of the Society and their professional activities. Members are always interested in the doings of their fellow-members, and the Society welcomes notes from members and concerning members for insertion in this section. All communications of personal notes should be addressed to the Secretary, and items should be received by April 15 in order to appear in the May issue.

CHANGES OF POSITION

ALBERT R. DISMUKES has become affiliated with Joseph E. Lowes, Inc., construction engineers, Dayton, Ohio, in the capacity of efficiency engineer. He was formerly engineer with The Emerson Company, New York.

JOHN W. MORTON, formerly connected with the Diesel department of the Emergency Fleet Corporation, U. S. Shipping Board, Philadelphia, Pa., is now associated with The Hooven, Owens, Rentschler Company, in charge of the Diesel department, with office in New York.

PHILIP BRASHER, until recently director of personnel, Guggenheim Brothers, New York, has assumed the position of industrial engineer with The Tide Water Oil Company, New York.

R. W. ELLINGHAM has resigned as works manager of the Heald Machine Company, Worcester, Mass., to take a similar position with The Van Norman Machine Tool Company, of Springfield, Mass.

CHARLES J. MANUEL has become associated with the S. W. Card Manufacturing Company, Mansfield, Mass., in the capacity of mechanical engineer. He was formerly connected with the American Steam Gauge and Valve Company, Boston, Mass.

RALPH E. CARPENTER has resigned his position as manager of the Lynite Laboratories of Aluminum Manufactures, Inc., Cleveland, Ohio, and has become associated with the Hollister-White Company, Inc., Boston, Mass.

EDWARD C. GAINES has joined the engineering forces of Mead Morrison Manufacturing Company, Chicago, Ill. He was formerly engineer, crane and conveying machinery department, Dominion Bridge Company, Montreal, Canada.

FRANK D. RANDOLPH, formerly connected with the Kelly Press Department of the American Type Foundries Company, Jersey City, N. J., has accepted the position of production engineer with the Premier and Potter Printing Press Company, Inc., Plainfield, N. J.

CHARLES E. SMART has resigned his position as works manager, Wells Brothers Company Division of the Greenfield Tap and Die Corporation, Greenfield, Mass., and has assumed a similar position with W. and L. E. Gurley, of Troy, N. Y.

ALFRED B. STRICKLER has left the employ of the Singer Manufacturing Company, Elizabethport, N. J., and has become associated with the manufacturing engineering department of the Prest-O-Lite Company, Indianapolis, Ind.

OTTO FAGERSTROM, formerly employed by the Bethlehem Steel Company, Steelton, Pa., in the open hearth department, is now employed by the Empire Zinc Company, Canon City, Colo., in the capacity of draftsman.

F. H. BALLOU has resigned his position as assistant chief engineer of the Great Western Sugar Company, Billings, Mont., and has taken up the duties of chief engineer of the Amalgamated Sugar Company at Ogden, Utah.

L. B. EASTON has accepted the position of superintendent of production, Laidlaw Works, Worthington Pump and Machinery Corporation, Cincinnati, Ohio. He was formerly associated with Henry R. Worthington, of St. Louis, Mo., in the capacity of sales manager.

THOMAS A. BROWNE, until recently identified with the Jones Speedometer Company, New Rochelle, N. Y., has entered the employ of the Weston Electrical Instrument Company, Newark, N. J.

CARLYLE D. BIDWELL has resigned his position with the International Harvester Company, Milwaukee Works, and is now with the J. I. Case Plow Works Company, Racine, Wis., as superintendent of construction and works engineer.

M. P. HEINZE, formerly superintendent of the Union Special Machine Company, Chicago, Ill., has become connected with the Krebs Manufacturing Company, of the same city, in the capacity of works manager.

J. C. McKenzie, who for over a year has been with the Performance Branch, Emergency Fleet Corporation, in charge of trial trip data, New York office, has accepted a position as marine engineer with the Power Specialty Company, New York. He will be in charge of the service department for Foster marine superheaters and Foster marine boilers.

David J. Lewis, Jr., has severed his connection with S. J. Wayte, Inc., New York, as secretary, and is now sales agent for the Cresson-Morris Company, and the Kestner Evaporator Company of Philadelphia, with headquarters in New York.

Albert J. Becker has resigned his position as professor of applied mathematics at the University of North Dakota, Grand Forks, N. D., and has assumed the duties of secretary and treasurer of the Ohio Valley Roofing Company, Evansville, Ind.

Clarence M. Finch, formerly employed in the research division of the inspection department, Aetna Life Insurance Company, Hartford, Conn., is now associated with the building department of the General Electric Company, West Lynn, Mass., as mechanical engineer.

M. V. Terry has resigned his position of assistant chief engineer with the Pan Motor Car Company, of St. Cloud, Minn., to accept the position of chief engineer, Champion Ignition Company, Flint, Mich.

Harry H. Bates has left the employ of the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., as field engineer, stoker department, to accept the position of superintendent, equipment service department, of the Acme White Lead and Color Works, Detroit, Mich.

D. George McMillan has severed his connection as superintendent of power with the Singer Manufacturing Company, Elizabeth, N. J., and is now with the Williams Printing Company, of New York City, in the capacity of maintenance engineer.

G. L. Bohannon, formerly chief engineer and assistant general manager, Youngstown Steel Car Company, Youngstown, Ohio, is now connected with the Thomas Spacing Machine Company, Pittsburgh, Pa., as manager of their eastern office in Philadelphia, Pa.

Roy E. Brakeman, who has been chief engineer of the Fairfield Works of the Tennessee Coal, Iron and Railroad Company, Fairfield Works, Birmingham, Fla., is now chief engineer of the Otis Steel Company, Cleveland, Ohio.

ANNOUNCEMENTS

Everett W. Swartwout has become associated with the engineering department of the National Aniline and Chemical Company, New York.

David S. Wegg, Jr., has entered the employ of The Allis-Chalmers Manufacturing Company, as sales engineer in the Chicago office.

H. T. Cory, consulting engineer, has sailed for England whence he will proceed to Egypt, as one of the three members of an international consulting commission to pass on plans for irrigation work in the Nile Valley. His fellow-members of the commission will be an English engineer and an engineer from India.

C. T. Baker, formerly of the engineering department of the Atlantic Ice and Coal Corporation, Atlanta, Ga., has opened an office in Atlanta, Ga., for the practice of consulting engineering in the field of steam, ice-making, cold storage and industrial plants.

Emil F. Norelius, formerly associated with the Holt Manufacturing Company, of Peoria, Ill., announces the opening of offices in Minneapolis, Minn., as consulting and designing engineer. During the war, Mr. Norelius was identified with the development of artillery tractors, tanks and self-propelled heavy artillery of the caterpillar type. He was connected with the Holt Manufacturing Company for ten years, lately in the capacity of chief engineer.

Charles M. Manly and C. B. Veal, both of whom were formerly associated with the Curtiss Aeroplane and Motor Corporation, New York, announce the establishment of offices in New York City as industrial engineers, specializing in the coördination of engineering and manufacturing requirements in the design, production and operation of automotive power plants and vehicles.

M. K. Bryan, associated with John A. Stevens, of Lowell, Mass., is now in charge of the Cleveland office of the firm which was recently opened, and which is thoroughly organized to render consulting engineering services for the analysis, construction and management of power plants.

F. A. Combe has severed his connection as chief engineer for Canada, Babcock and Wilcox, Ltd., to practice as consulting engineer, specializing in boiler-plant design and operation, generation and utilization of steam, combustion of fuels, heating and ventilating, with offices in Montreal, Canada.

Henry P. Kendall has become a member of the firm of Webb, Kendall and Bruce, Inc., which was recently organized for the purposes of industrial management, with offices in New York and Boston, Mass.

Prof. Dugald C. Jackson and Edward L. Moreland have recently announced the establishment of a partnership as consulting engineers with offices in Boston, Mass. The work of the new firm will include the preparation of plans and specifications, supervision of construction, general superintendence and management, examinations and reports, in continuation of the work of the firm of D. C. and William B. Jackson, Boston and Chicago, which has been dissolved.

John Younger has been cited "for exceptionally meritorious and distinguished service as advisory engineer in the designing and production of standard motor vehicles adopted by the United States of America."

John R. Curry, formerly secretary and chief engineer of the Hall-Curry, Construction Company, of Indianapolis, Ind., has reëngaged in business in the same city under the name of John R. Curry, contracting engineer, continuing in the same line of general building construction.

Hubert C. Verhey has recently resigned his position as head of the Diesel Engine Unit, Emergency Fleet Corporation, and has opened an office in Philadelphia, Pa., as consulting engineer on matters pertaining to supervision of design, manufacture, operation, installation and survey of equipment for vessels with oil-motor propulsive power and their auxiliaries.

Frank L. Walter has severed his connection with the Dayton Engineering Laboratories Company, with whom he was engaged during the past eight years as master mechanic, and has opened offices in Dayton, Ohio, under the firm name of The Walter Engineering Company, engineers, designers and builders of special tools and machinery.

Edwin A. Rogers has resigned his position as power plant engineer of the New Cornelia Copper Company, Ajo, Ariz., and has opened a consulting engineering office in San Francisco, Cal., specializing in fuel-oil combustion and power-plant efficiency work, handling, also, general problems in the design and installation of oil-fired plants.

Edward H. Thomas has left for the Philippine Islands, to assume charge of a sugar mill in Negros which is being erected by the Philippine Vegetable Oil Company.

Rudolph H. Fox is now eastern representative of the Gurney Ball Bearing Company, of Jamestown, N. Y., with office in Hartford, Conn. He was formerly connected with the company as manager of the Detroit district.

Col. W. A. Dibblee, formerly manager, Inspection Division, Cincinnati district, Ordnance Department, U. S. A., announces his connection as field manager with The Western Appraisal Company, and The National Industrial Engineering Company, Cincinnati, Ohio.

APPOINTMENTS

M. Wm. Ehrlich has been appointed New Jersey manager, in charge of the new office of The Plant Engineering and Equipment Company, Inc., of New York City, which has recently been opened. Mr. Ehrlich's headquarters are at Newark, N. J., with sub-office at Lyndhurst, N. J.

William B. Powell, treasurer of Cundall, Powell and Mosher, Inc., of Buffalo, N. Y., has been appointed chairman of the local Chamber of Commerce Committee on Smoke Abatement.

Clifford H. Peters has recently established an office in Cleveland, Ohio, to carry on consulting mechanical engineering. He will handle work in connection with plant layouts and equipment, production engineering and machine design. Mr. Peters served during the war as Captain of Ordnance, stationed at Washington, D. C.

H. B. Viedt, who has been assistant superintendent and mechanical engineer for the extraction plant of the Radium Luminous Material Corporation, has been transferred to the position of mines manager of their mines, with headquarters at the Long Park group of mines, which are located about 20 miles from Maturita, Colo.

Mason A. Stone, Jr., has resigned his position as industrial engineer with Lockwood, Green & Co. and has become associated with J. C. Henriques, late with the Consolidated Gas Company, in the formation of the Engineering and Appraisal Company, Inc., with offices in New York City. The company will undertake the design, construction and appraisal of industrial plants, particularly of chemical works, and is prepared to investigate and report on new projects and manufacturing methods.

Robert C. Douglas, who has represented the Norton Company in upper New York State, has been appointed manager of the Norton Company of Canada, Ltd., who are building a plant at Hamilton, Ont., for the manufacture of Norton grinding wheels.

NECROLOGY

PIERREPONT BIGELOW

Pierrepont Bigelow, treasurer of the Bigelow Co., New Haven, Conn., died on January 27, 1920. Mr. Bigelow was born in August 1888 in New Haven. He received his early education at Hill School and then attended Sheffield Scientific School, Yale University, from which he was graduated in 1910. Upon leaving college he became connected with the Bigelow Co., serving his apprenticeship in their works. Later he was in charge of the engineering and production work of the plant and at the time of his death held the position of treasurer.

Mr. Bigelow became a junior member of the Society in 1914. He was a member of the Yale Club in New York and the Graduates Club in New Haven.

CHARLES B. CALDER

Charles B. Calder, vice-president and general manager of the Toledo Shipbuilding Co., Toledo, Ohio, died on January 23, 1920. Mr. Calder was born on January 15, 1853, in Antwerp, N. Y. In 1866 his father went into partnership in a shingle-mill venture and the son ran the engine in the mill until 1872. In that year he shipped as cook on a little schooner and later obtained a second engineer's license. In the following years he shipped on many vessels and in various capacities, spending all his spare time in studying for advancement.

In 1891 he accepted the position of chief engineer with the Menomee Transportation Company's steamers, and in 1894 became superintendent of the Dry Dock Engine Works, Detroit, Mich., holding this position until 1899, when he was appointed general superintendent of the Detroit Shipbuilding Co. In the fall of 1905 he resigned to become one of the incorporators of the Toledo Shipbuilding Co., of which he was made general manager. In 1909 he was elected to the position of vice-president.

Mr. Calder was a member of the American Society of Naval Engineers and of the American Society of Naval Architects and Marine Engineers. He also belonged to several clubs and fraternal associations. He became a member of our Society in 1895.

FRED PERCY CLEVELAND

Fred P. Cleveland, secretary and treasurer of B. F. Perkins & Sons, Holyoke, Mass., died at his home in that city on February 10, 1920, after a brief illness of influenza followed by pneumonia.

Mr. Cleveland was born in Holyoke, Mass., on January 20, 1885, and was educated in the schools of that city. He later attended Cornell University, from which he was graduated in 1906 with the degree of M.E. Immediately upon graduation he became associated with B. F. Perkins & Sons, Inc., and for several years has been the active manager of the company. Under his management the business developed greatly, necessitating the construction of a new plant in Willimansett. Mr. Cleveland was very much interested in this project, and his unceasing work to obtain its accomplishment without doubt weakened his vitality.

Mr. Cleveland was a member of the Engineering Society of Western Massachusetts. He became an associate member of our Society in 1914.

ALFRED W. COOKSON

Alfred W. Cookson was born on September 13, 1868, in Birmingham, England, and was educated in the schools of that city. He served an aprenticeship to James Archdale & Co., Birmingham, builders of machine tools and special machines. Upon coming to this country he was employed by the Baldwin Locomotive Works, Philadelphia. He also worked for a number of years in Cramp's Shipyard, Philadelphia. Later he went to Hornell, N. Y., where he acted in a consulting capacity to firms interested in silk-knitting and silk-weaving machines. For four years he was associated with the Willys-Morrow Co., Elmira, N. Y., as maintenance and construction engineer. Because of failing health he was obliged to give up active work. He died on January 11, 1920.

Mr. Cookson became an associate of the Society in 1917.

EDMUND MILLS

Edmund Mills, engineer in the marine department of the Babcock & Wilcox Co., died on January 26, 1920. Mr. Mills was born on February 15, 1864, in New York City. He was educated in the schools of Jersey City. He served an apprenticeship as machinist and worked for a short time at that trade. For two years he was chief draftsman for the United Electric Traction Co., and from 1891 to 1895 held a similar position with the Wheeler Condenser & Engineering Co.

About twenty-five years ago Mr. Mills entered the marine department of the Babcock & Wilcox Co., as draftsman and continued in that department all the rest of his life. For a number of years he was chief draftsman of the department. In 1908 he was transferred to the marine department of the general office as one of its engineers. He had become an expert on the production and use of steam and was an engineer of unusually fine mechanical judgment.

Mr. Mills was a member of the Society of Naval Architects and Marine Engineers and of the American Society of Naval Engineers. He became a member of our Society in 1903.

JOHN LANGTON

John Langton, consulting engineer, New York City, died at Inspiration, Ariz., on February 6, 1920. Mr. Langton was born on August 29, 1857, in Toronto, Ont., Canada. He received his early education in Canadian schools and later attended Owen's College, Manchester, England, where he studied mechanical engineering.

From 1876 to 1889 he was connected with the following firms: Portland Co., Northern Railway Co. (Toronto), Brown & Sharpe Manufacturing Co., Electric Tube Co. and the Edison Machine Works. In 1889 he became general manager of the Canadian Edison Manufacturing Co., and the following year manager of the Canadian works of the Edison General Electric Corp. In 1892 Mr. Langton went into consulting work and during the following years he served in that capacity for the Detroit Copper Mining Co., the Moctezumm Copper Co., the Dawson Fuel Co., and the Caranea Consolidated Copper Co. In collaboration with Mr. Charles Separd he did work of a consulting nature for the Moctezumm Copper Co. and the Copper Queen Co., Ariz.; with Mr. F. L. Antisell for the Raritan Copper Works, and with Mr. C. R. Weymouth for the Inspiration Consolidated Copper Co., Arizona.

Mr. Langton became a member of the Society in January 1920.

ALEXANDER FULLERTON McKENNA

Alexander F. McKenna was born in Belleville, Ontario, Canada, in July 1870 and was educated in the public schools of that town. He served a five-year apprenticeship in the machine trade and from 1891 to 1893 was connected with the Lloyd & Stinett Engine Works, Erie, Pa., as machinist. For a short time he was with the Erie City Iron Works, when he returned to Canada to work for the Brown Foundry & Machine Shops, Belleville, on boiler and bridge erection. Later for one year he was superintendent and chief engineer of the Paisley Light & Water Works Plant, Paisley, Ont., and for the next six years was with the Canadian Pacific Railway Shops.

For the last seventeen years Mr. McKenna was associated with the Babcock & Wilcox Co., Ltd., in erection work, and at the time of his death, January 9, 1920, held the position of superintendent of erection for Western Canada.

Mr. McKenna became an associate of the Society in 1918.

NELSON STEPHEN PRINGLE

Nelson S. Pringle, assistant engineer in charge of production with the Autocar Co., Ardmore, Pa., died on February 2, 1920. Mr. Pringle was born in Newark, N. J., on November 19, 1885, and attended the schools of that city. He left school to enter commercial life, and was for six years connected with the New York Export & Import Co.

He then became a student at Stevens Institute of Technology, from which he was graduated in 1911 with the degree of M. E. In the same year he entered the employ of the Autocar Co. as experimental engineer and remained with the company until the time of his death in various capacities.

Mr. Pringle became an associate member of the Society in 1914. He was also a member of the Society of Automotive Engineers, the Engineers' Club and the Philadelphia Rifle Club.

ROBERT CLARKSON REID

Robert C. Reid, secretary of the Harrolds Motor Car Co., New York, died in that city on January 11, 1920, from injuries received in an automobile accident. Mr. Reid was born on July 8, 1875, in Kingston, N. Y. He was educated in the schools of Nyack, N. Y., and Englewood, N. J. He also attended Pratt Institute, Brooklyn, and Cooper Union, New York, to obtain his technical training.

He served his aprenticeship with R. Hoe & Co., manufacturers of printing presses, and in 1897 became connected with the American Sugar Refining Co. as draftsman. He left this concern to become salesman for the Chapman Valve Co. Later he held a similar position with the Hewitt Motor Co. In 1907 he became associated with the Harrolds Motor Car Co. as manager of their truck department, and four years later become secretary of the company.

Mr. Reid was a member of the Society of Automotive Engineers and of the Motor Truck Club of America. He became a member of our

Society in 1907. During the Spanish-American War he served as corporal in the Fifth New Jersey Volunteer Infantry.

HENRY WEBBER

Henry Webber was born in Bishops Tawton, Devonshire, England, on September 15, 1848. He was brought to this country when about three years of age, his parents settling in Dunmore, Pa., then known as Bucktown. He lived in Dunmore until the time of his death, January 2, 1920.

Mr. Webber served his apprenticeship as a machinist with the Pennsylvania Coal Co. in Dunmore shops for four years, then becoming connected with the Dixon Manufacturing Co., Scranton, Pa., where he was employed for five years as a machinist. At the end of that period he was advanced to the position of draftsman and later on made mechanical engineer. In this capacity he worked on the designing of hoisting engines and breaker machinery for the anthracite coal mines. He also had charge of designing and erecting blast-furnace engines for both the Lackawana Coal & Iron Co. and the Lackawanna Iron & Steel Co.

In 1901 Mr. Webber resigned from this company to become mechanical and consulting engineer with the Finch Manufacturing Co., Scranton, Pa., which position he held at the time of his death.

Mr. Webber was for some time a member of the Engineering Society of Northeastern Pennsylvania, resigning two years before his death. He belonged to several fraternal organizations. He became a member of our Society in 1886.

WALTER J. WARDER

Walter J. Warder, chief engineer of Roth Brothers & Co., Chicago, Ill., died on January 20, 1920. Mr. Warder was born in Chicago on August 14, 1879. He was a graduate of Lewis Institute in electrical engineering. Upon graduation he was for four years with the Western Electric Co., Chicago. He was then employed by Roth Brothers & Co., where he designed a complete line of direct-current motors and generators.

To broaden his experience he was for a time with the Western Electric & Manufacturing Co., East Pittsburgh, Pa.; Adams & Westlake Co., Chicago, and the Crocker-Wheeler Co., Ampere, N. J. Leaving the electrical line he engaged with the Tampa Steam Ways Co., Tampa, Fla., in shipbuilding. In 1917 he returned to Roth Brothers as chief engineer in electrical and mechanical design.

Mr. Warder was particularly able in the design of direct-current motors and generators and had great influence in the design of motors for elevator work. He was a Fellow of the American Institute of Electrical Engineers and member of the Western Society of Engineers. He belonged also to a number of clubs in Chicago and several fraternal organizations. He became a member of our Society in 1911.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

INSTRUCTOR IN MECHANICAL DRAWING and descriptive geometry, preferably young man with shop or drafting-room experience. College degree not essential. Location New Jersey. Z-513.

HIGH-GRADE TOOL DESIGNER with considererable experience on design of milling fixtures; must be able to analyze wide variety of jobs and make layouts of suitable fixtures. Apply by letter giving in detail experience and salary expected. Cincinnati Milling Machine Company, Oakley, Cincinnati, Ohio. Z-524.

CONSTRUCTION SUPERINTENDENT for large new steam-power plant. Must be competent field man. Strong on organization and understand construction work records. Permanent position. Reply stating salary required, giving experience and reference. Location Wisconsin. Z-527.

MASTER MECHANIC to have charge of all maintenance, including machine upkeep, saw filing, knife grinding, and power operation. Salary $200-$250 per month. Location Virginia. Z-534.

TEST ENGINEER; work consists in running reserve and standard-engine tests on aviation engines, both domestic and foreign. Testing facilities are very good for person desiring experience in aviation engines; position offers a wonderful opportunity. Requirements are graduate mechanical engineer or equivalent trade experience and about a year's experience with internal-combustion engines. Salary is $2200 to start and work is under Civil Service. Address Engineering Division, Air Service, Power Plant Section, McCook Field, Ohio. Z-536.

SALES ENGINEER AND INSIDE MAN to handle secretarial work for concern manufacturing outdoor substation equipment for electric-power companies. Two openings. Salary about $200 per month. Location Pennsylvania. Z-537 A&B.

SALES ENGINEER for company manufacturing conveying machinery. Recent graduate would be considered. Salary $125 per month. Location New York City. Z-539.

MAN with experience in drying rooms, particularly in the drying of metal parts coated with inks, but not japanned. Location New Jersey. Z-540.

SALES ENGINEER experienced in power-plant work. Canadian or American thoroughly familiar with Canada; 30-35 years of age. Location Canada. Z-543.

ENGINEER for design and supervision of installation of air-conditioning, air washer and air-exhaust systems in large textile plants. Will involve new problems in reducing dust in rooms, power saving on present systems and general industrial air engineering. State age, whether single or married, practical experience, salary expected and when available for work, also references, applying to this line of work. Z-544.

SEVERAL GREEN ENGINEERS to drill for foremanships in an agricultural implement factory near Philadelphia. State initial salary wanted. Describe education with dates. State number weeks in each occupation and exact duties. Z-547.

MECHANICAL DRAFTSMAN for machinery layouts for zinc plant in Pennsylvania, near Bethlehem. Z-555.

MECHANICAL ENGINEER for machinery-construction work in zinc plant in Pennsylvania. Z-556.

EXCELLENT OPPORTUNITY is open for technically trained man to become associated with prominent engineering organization in capacity of sales engineer. Knowledge of general power-plant engineering is essential. Salary will be commensurated with ability. Send photograph, together with record of your work. Z-557.

INDUSTRIAL PHYSICISTS. An established research laboratory of well-known manufacturer offers positions to qualified scientific men who have research ability. One or two men of scientific training in physics and experience in research are desired. There is also position open for a physicist with less experience but with creative ability. Working conditions are attractive and positions are permanent. Location Ohio. Z-558.

ENGINEER with creative and analytical ability and pleasing personality is desired by laboratory interested chiefly in development of lighting. Some experience in lighting desirable though not essential. Permanent position amid pleasant surroundings awaits one who can qualify. Location Ohio. Z-559.

YOUNG ENERGETIC ENGINEER of high professional qualifications and some laboratory experience for assistant to research engineer. Location Massachusetts. Z-561.

PRODUCTION MANAGER for tool and die plant; necessary to possess ability for theory of tool-making and production methods. Location Ohio. Z-563.

EDITOR for house publications of large manufacturing plant; must have pleasing personality, be able to meet and talk with technical experts on various subjects, and be capable of writing high-class articles. Location New York State. Z-564.

ENGINEER FOR SHOP RECONSTRUCTION to reconstruct, enlarge and reorganize shops of electric-traction company, operating about 365 cars in its schedule, and owning about 416 passenger cars among its other equipment. Type of car in use is 32 ft. long overall, weight about 10 tons, and is equipped with single truck and two 25-30 hp. motors. Is necessary for shop to build all car bodies, and because of distance from source of supplies, to handle great variety of work. Man with general experience in construction and maintenance of electric-railway rolling stock desired. First couple of years would be consumed in construction of additional shops building and equipments. Young man willing to grow with company desired. Knowledge of Spanish not essential, but preferable. Salary $300-$500 per month. Location Cuba. Z-572.

DRAFTSMEN for car shop work on comparatively simple structural steel, plate, and casting design involved in the designing and detailing of industrial cars. Location Easton, Pa. Z-578.

MECHANICAL ENGINEER, high-grade man, with extensive experience and with organizing and executive ability; man who can adapt himself to conditions as he finds them in an industrial plant desired. Man not over 35 years of age preferred. Location Ohio. Z-580.

MACHINE TOOL, DETAIL DRAFTSMAN; must be first-class man in this line of work; state experience in detail and salary desired. Location western New York. Z-581.

MECHANICAL ENGINEER for manufacturer of bicycles, coaster brakes and pedals for bicycles. Man thoroughly familiar with this class of work and especially efficient in stampings, one who can design tooling for making necessary stampings for bicycle constructions wanted. Location Ohio. Z-586.

ENGINEER to handle questions of power-plant operation, including electrical generation, refrigeration, compressed-air and vacuum pumping and boiler plant. Location New York at present. Z-604.

ENGINEERS for design work; machinery designers, power-plant designers and reinforced-concrete designers. Permanent positions. Apply to Mr. C. B. Buerger, 3144 Passyunk Ave., Philadelphia, Pa. Z-605.

DESIGN AND RESEARCH ENGINEER, keenly analytical, resourceful and thorough. Work would involve improvement in design and specification of line of small unit refrigerating compressors and parts, also development of new designs for experimental purposes. State age, salary desired to start and qualifications for position in detail. Location New Jersey; within 35 miles of New York. Z-608.

INSPECTOR of material for service in United States. Must be technical graduate with at least two years' experience with large manufacturing concern. Salary $150 a month, plus $20 a month Congressional bonus after thirty days' satisfactory service. Applicants should write to Chief of Office, the Panama Canal, Washington, D. C. Z-609.

MECHANICAL ENGINEERING GRADUATES, class of 1920, as student engineers in training course of large company. Excellent opportunity for experience in theoretical mechanical engineering. Location Mass. Z-611.

ENGINEER to act as draftsman and designer in connection with laying out of power-house equipment, and connecting of steam lines. Should be familiar with boiler-house accessories, steam-turbine piping and accessories, pumping-house layouts and equipment. Location Ohio. Z-612.

WORKS ENGINEER whose duties will be to collate various branches of engineering department with object of getting closer coöperation with production department. Position requires engineer of considerable experience and executive ability. Applications are invited from men capable of handling position. Give full outline of experience, references, salary requirements and endeavor to sell themselves in first letter. Address communications to Chief Engineer, Timken Roller Bearing Company, Canton, Ohio. Z-621.

MACHINE DESIGNER with experience designing automatic machinery involving feeding of small parts and performing various operations upon them is the one who would best fill requirements. Man who will not only design but execute his own detail and working drawings and possibly follow the building and development of the actual machines when approved desired. Location Rochester, New York. Z-622.

LARGE NEW ENGLAND MANUFACTURER of electrical apparatus wants young men with some experience in drafting who desire to improve their opportunities. To such as have good high-school education and some technical training but who for some reason were not able to complete their technical course, we offer opportunity to work as draftsmen at good wages and at the same time, without expense, attend courses of instruction to prepare them for positions here as calculators or designers of electrical apparatus or specialists in sales organization. Location Mass. Z-628.

MECHANICAL ENGINEER should be competent on questions of machinery, mechanics, steam, boilers, buildings, and all necessary work of high-grade mechanical nature. Location Boston, Mass. Z-629.

ELECTRICAL CHEMICAL ENGINEER to investigate the commercial feasibility and electrolytic process involving iron. Must speak French and be good practical man. Temporary position for six weeks. Z-631.

DRAFTSMAN familiar with sewer design, possessing good knowledge of concrete and timber design, if possible with mapping and survey experience also. Location Delaware. Z-632.

POWER ENGINEERS with general power experience including design, construction and operation. Location Delaware. Z-633.

TECHNICAL GRADUATES IN MECHANICAL ENGINEERING of classes of 1919 and 1920 desired at once in engineering department of manufacturer of recording meters and power-plant equipment. Character of work gives good experience and position offers excellent opportunity for advancement. Location Cleveland, Ohio. Z-636.

ESTABLISHED ENGINEERING CORPORATION wishes to enlarge its scope. Want thoroughly competent civil, mechanical and structural engineering department heads, also chief draftsman. Investment in company required. An exceptional opportunity for a high-grade, ground-floor connection. Give full details in first letter. Replies strictly confidential. Location Seattle, Washington. Z-637.

CHIEF DRAFTSMAN and steam, electrical and structural draftsman for industrial and construction work. Location New York City. Z-639.

SALES ENGINEER: aggressive man for British Columbia Territory; must be qualified mechanical engineer and be fully conversant with power-plant equipment, design and construction, as well as general mechanical lines. To one having combined qualities of salesman and engineer, this offers wonderful opportunities. Right man will be adequately reimbursed on salary and commission basis. Applicants are requested to state fully previous experiences and qualifications. Replies are to be addressed to L. R. Scott, Room 607, Credit Foncier Bldg., Vancouver, B. C. Z-646.

ENGINEERS—Civil and Mechanical. Graduate engineers, preferably with two or three years' practical experience. Positions open include general engineering work; estimating; drawing up specifications for machinery, construction materials, etc.; preparing bills of material for construction work, and compiling technical reports and reviews, etc. Applicants must state age, education in detail, experience in detail to date, time available and references. Large industrial corporation near Newark, N. J. Salaries from $135 to $165 per month, according to training and experience. Z-647.

ASSISTANT TO PLANT ENGINEER: must have technical training, mechanical and electrical power-plant and construction experience. College graduate who has right amount of intelligence and four or five years' experience will do. Would have opportunity of qualifying for position of plant engineer and would be given chance to familiarize himself with all plant work, so that he would in time be able to handle the position. Location New York State. Z-648.

IRON AND STEEL METALLURGIST. Must have all-around experience in various phases of the iron and steel industry and must be particularly acquainted with the heat treating of iron and steel and with iron-foundry practice. Duties mainly of a research character. Location New York. Z-651.

DESIGNERS for the Philippine Service of the Insular Bureau. Following men needed: 3 civil engineers, for reinforced-concrete designing; 2 civil engineers for structural steel design and detail, and one civil engineer for design of subaqueous foundations, etc. Maximum salary four thousand dollars per annum. Transportation to Manila subject to deduction from salaries in monthly installments and refunded after two years' satisfactory service. Also one electrical engineer for designing hydro-electric and other power plants at salary from three to four thousand; one electrical and mechanical engineer for crane design and layouts for gas-engine power plants at salary three to four thousand; and one civil engineer for subaqueous foundation construction at salary three thousand to thirty-five hundred. Transportation paid both ways. Special one year contract. Z-635.

ASSISTANT ENGINEER to do preliminary drafting for construction of copper Cathods, stripping machine; to follow work through shop, to erect machine at plant and to supervise experimental work at plant. If capable man will ultimately be placed permanently on staff. Location Pittsburgh, Pa. Z-656.

SALES ENGINEER young man with some college or technical-school education to ultimately be assigned to sales force, after taking course at factory in engineering department. General laboratory and experimental work to begin with, together with computing of layouts, and proposals for lighting, costs, and maintenance. This will take year or little longer and will give candidate full opportunity to learn lamps thoroughly and be conversant with their uses and ultimately fit him for outside sales engineering work. Salary $100-$125 per month to start. Location New Jersey. Z-658.

HIGH-GRADE FACTORY-LAYOUT MAN; must be acquainted with latest practices of laying out department in most efficient manner, particularly in conjunction with conveyor systems. Location New York State. Z-659.

STRUCTURAL DETAILERS AND CHECKERS experienced on mill buildings. Preferably men whose experience has been with plants actually fabricating steel. Rates will range from $150 up, depending entirely upon ability. Location large Southern steel centre. Excellent working and living conditions. Z-676.

MECHANICAL ENGINEERS AND DRAFTSMEN; truck or tractor experience preferred but not necessary, to fill positions as detailers, designers, and lay-out men, leaders and checkers. Salaries $150 per month and up. Location Middle West. Z-679.

ENGINEERS experienced in manufacture of gas and gas apparatus; salary commensurate with ability. Location Middle West. Z-680.

ENGINEER MATHEMATICIAN AND PHYSICIST; salary commensurate with ability. Location Middle West. Z-681.

MECHANICAL ENGINEERS with experience in design and construction of air compressors and pneumatic tools. Young man with capital to join advertiser in organizing company for the production of air compressors and tools in Canada. Z-682.

ELECTRICAL, MECHANICAL, AND CHEMICAL ENGINEERING MEN of 1920 class or those that have not been away from college more than two or three years at most. Company is planning considerable expansion in incandescent-lamp industry within next five years and believe that opportunity for advancement for engineering men will be particularly good. Starting salary will probably range from $1500 to $1800 per year depending entirely upon experience and training. Location New Jersey. Z-684.

DESIGNING DRAFTSMAN; must be well versed in machine-shop practice, pattern making, strength of materials, and in thermo-dynamics, the first two because all commercially designed machinery must consider simplicity and ease of molding and machining; must be versed in strength of materials so as to properly proportion the various sections of machine designed, and have knowledge of thermo-dynamics and steam because the work at plant is in connection with handling and use of steam. Will direct work of two draftsmen, but personally would be expected to do necessary amount of initial-thought development as subjects presented required. Must be competent to take rough sketch development of an idea and work it out to a complete commercial possibility. Location Boston, Mass. Z-686.

SUPERINTENDENT to take charge of manufacture of drop forging for use on vehicle shafts and poles. Must have had experience in this line of work. Location Ohio. Z-691-A.

STEEL ENGINEER to handle laying out of forging plant, and the construction of it. Location Ohio. B-691-B.

DESIGNER AND DETAILER for steel-plate contract shop. One familiar with ordering material, detailing and designing desired. State age, salary expected and how soon you could report for duty. Permanent position. Location Maryland. Z-692.

FIRST-CLASS T[illegible]-STUDY MAN. Man with technical education or one with practical machine-shop experience, who will be able to go ahead and set rates on different operations and make time study of same, desired. Location New York state. Z-696.

MECHANICAL DRAFTSMAN for piping and plant-layout work; experienced in sugar machinery desirable; 6 months' to 1 year's work; position may become permanent. Expenses paid to and from Cuba. Z-709.

POWER SUPERVISOR to take charge of technical control of boiler rooms, carry on bonus system which is already installed, and in general, act in all matters relating to power and steam generation, distribution and use in paper mill. Company is installing fuel-oil equipment for boiler plant which will require lot of testing. Power supervisor would undertake this work in connection with his regular duties. Young technical graduate who has had some power-plant experience, particularly on the steam end desired. Location Massachusetts. Z-713.

COMBUSTION ENGINEER, capable of not only directing force of boiler room, soon to consist of thirty-two 600 hp. boilers, part using underfeed stokers and part using oil, from standpoint of both continuity of service and reduction of operating and maintenance expense and also qualified in bringing utmost efficiency possible, with existing installation, into operation of the boilers and furnaces. Only first class man considered. Location Rhode Island. Z-715.

REINFORCED-CONCRETE DRAFTSMAN for factory-building work. No designing. Location New York City. Z-719.

MAN TO WRITE ARTICLES, advertisements, catalogs and hand books on engineering subjects, mostly in lines of mechanical and steam engineering. Young technical graduate who has shown some inclination or aptitude for writing desired. Location New York City. Z-720.

YOUNG MECHANICAL ENGINEER, technically trained and with some experience, to act as assistant to present maintenance engineer of industrial plant. Scope of work will be very broad and man will receive valuable training. Salary paid will depend upon age, experience and general ability. Location New Jersey. Z-721.

YOUNG GRADUATE MECHANICAL ENGINEER, for inspection and test work. Must be progressive, resourceful and interested in industrial plant work. State age, education and salary expected. Location Virginia. Z-722.

EXPERT ACCOUNTANTS; must be between ages of twenty and forty, and have had considerable accounting experience, or have graduated from an accounting school. Salary commensurate with ability. Location New York State. Z-724.

YOUNG ENGINEER, who has had little experience, but who is especially strong in those qualities of leadership that make executives. Should be able to meet and coördinate all the various elements that enter into ordinary factory work so as to get coöperation from every type of individual. Good experience and opportunity for betterment to man with right qualifications. Location New York State. Z-725.

PATENT DRAFTSMAN must be first class experienced man. Position pays about 80c to $1 per hour. Location Conn. Z-726.

ASSISTANT PROFESSOR in mechanical engineering. Must have degree of M. E. and teaching experience and be qualified to handle design courses. Salary $2500 for 11 months starting September 1. A growing department with good opportunity for advancement. Location Ohio. Z-728.

ADVERTISING MANAGER; must have successful record as such. Preference will be given to one with technical education or mechanical aptitude. Must have initiative and be capable of taking over entire burden of department and carry it well. Unusual opportunity to become an integral part of well-established and splendidly backed institution. When replying give full details and last three positions held and salary expected. Address Box 852, Detroit, Mich. Z-729.

MEN FOR RESEARCH WORK on the application of pyrometry to large metallurgical plant. Recent graduates in chemical or electrical engineering preferred. Location Pennsylvania. Z-730.

ASSISTANT TO DEPARTMENT SUPERINTENDENT; must be 30 to 40 years' of age and experienced in handling men. Department now employs 1000 to 1500 men. Graduate mechanical engineer with experience in metal industries desired. Location Penn. Z-735.

MECHANICAL ENGINEER for construction work in India, must be an American, unmarried and 30 years of age. Must have had 3 years' experience in outside construction work. Z-737-A.

RECENT GRADUATES in mechanical, electrical or chemical engineering. Good future. Salary $2500 and expenses. Location India. Z-737-B.

MAINTENANCE ENGINEER to take charge of reciprocating and centrifugal machinery for chemical plant. Must be capable of handling men, laying out work efficiently, making sketches, ordering new parts, indicating engines, setting valves, etc., in short to put neglected plant in good condition. Location Ohio. Z-738.

ENGINEER technical graduate must have purchasing agent experience and be familiar with making contracts. Location New York City. Z-740.

ASSISTANT TO WORKS MANAGER, young mechanical engineer, two years out of college. Location New Jersey. Z-753.

PURCHASING ENGINEER; technical degree not essential. Must have experience in purchasing factory supplies. Location New Jersey. Z-754.

ORDER-DEPARTMENT DIRECTOR. Man capable assuming charge, making and following up execution of purchase and shipping orders. Must have had experience in line of pushing delivery-car shipments and coördinating material on ground. Give full details first letter, with salary wanted. Z-756.

PLANT ENGINEER, with building-construction experience for pulp and paper company in Northern New York. Man about 30 years old preferred. Z-757.

MAINTENANCE ENGINEER for work at mine of large copper company. Location New Mexico. Z-758.

DESIGNING AND FIELD ENGINEER WITH cane, sugar-mill and machinery experience. Must have at least ten years' experience. Location Ohio. Not over 35 years of age. Z-759.

MARINE DRAFTSMAN; must have had most of experience in England, particularly on steam and marine work. Not over 35 years of age. Location Ohio. Z-760.

INSTRUCTOR IN MATHEMATICS for next school year at Brown University. Essential that candidate have had either experience in teaching or good mathematician. Engineering experience would be valuable addition to man's qualifications. Should be young man imbued with high ideals and possessing some social graces. About fourteen hours of teaching would be expected. Salary twelve to eighteen hundred dollars for first year Location Providence, R. I. Z-761.

SHOP EXECUTIVE. Must be thoroughly familiar with quantity production and small metal parts, in all phases of selection and arranging of machinery, jigs, tool design and direct supervision of manufacturing. Will be expected to direct, organize and put in successful operation factory, making entirely new product which has many small parts that must be accurately made in large quantities. Must be executive of initiative originality and practical experience. Will be permanent position, with ample opportunity for expansion and advancement for man who can do things in large way. Location Wisconsin. Z-762.

YOUNG GRADUATES IN MECHANICAL ENGINEERING, for development, to fill positions in experimental and maintenance departments of rubber factory. Company employs approximately 3000 men, located in the State of Michigan. Preferably men about to graduate. This is good opportunity with progressive organization. Z-763.

THREE FIRST-CLASS DRAFTSMEN for railroad-car detailing. Must be quick at understanding, fast and accurate workers. If not full of energy do not reply. Business is entirely export and has many opportunities for advancement outside of engineering department. Works at Hackensack, New Jersey, one-half hour from New York. Salary about $175 to start, depending on man. Reply giving experience and qualifications in detail to the Gregg Company, Ltd., Hackensack, N. J. Z-764.

MECHANICAL ENGINEER, having special knowledge of machinery, for production of bobbins, spools, etc., for textile works. Advertiser with capital plans building factory in Canada. State salary, age, references, full particulars. Z-765.

FOUNDRY SUPERINTENDENT to take operating charge of foundry department, gray iron only, daily capacity seven tons. Ontario Province. Z-766.

POWER-PLANT OPERATING ENGINEER, preferably technically-trained man familiar with power-plant work, including cars and operating of mechanical stokers, both over-feed and under-feed type, turbo, alternators, air compressors, pumps, etc. State age and experience. Location New Jersey, near New Brunswick. Reply to Chief Engineer, P. O. Box 939, Wilmington, Del. Z-767.

MECHANICAL-PLANT ENGINEER of technical education and initiative wanted by copper refinery in East. One preferred with some furnace and metallurgical experience, not necessarily copper. State qualifications fully and salary expected. Z-768.

EFFICIENCY ENGINEER to study and direct use of materials and supplies as well as labor, wanted by large industrial, metallurgical plant. Technical graduate with metallurigcal and mechanical experience preferred. State qualifications fully and salary expected. Z-769.

WANTED by first-class old-established firm near London (Eng.), chief designer steam turbines, blowers, compressors; large sizes. Only absolutely first-class engineers should apply. Give in detail fullest particulars experience, age, salary and contract expected. Applications held strictly confidential. Z-770.

BOILER-MAINTENANCE ENGINEER WANTED as inspector by public utility company operating several large interconnected plants. Trouble or erection engineer on large high-pressure boilers prefereed. Z-771.

SALES ENGINEER; technical graduate preferred but not essential, familiar with Eastern territory; must have experience in sale of power-transmission apparatus and be familiar with factory conditions. Liberal salary and splendid opportunity to connect with a growing concern. Territory New York and New England. Z-772.

MECHANICAL ENGINEER. Young technical graduate as assistant in construction department of manufacturing engineering company. Should have few years' general engineering experience. Location New York City. In reply state age, experience and reference. Z-773.

SPANISH TRANSLATOR, graduate in civil engineering to translate into Spanish two civil engineering books; preferably of Spanish or Spanish-American birth; work may be done on part time basis. Z-774.

ASSISTANT IN ENGINEERING AND SALES OFFICE. Young man, recent technical graduate in mechanical engineering. Location Providence, Rhode Island. Apply by letter, stating experience and salary expected. Z-775.

PROFESSORSHIP MECHANICAL ENGINEERING. University of the Philippines, Manila, P. I. Vacancy open July 1, 1920. Salary $3500. Two year contract, transportation to Manila paid. Applications should be sent to Bureau of Insular Affairs, War Department, Washington, D. C. Z-776.

INDUSTRIAL ENGINEER for plant-layout work, installation of efficiency methods in manufacturing plants, time studies and various industrial problems. In reply state fully experience, education and salary expected. Location Ohio. Z-777.

SALES MANAGER competent to take entire charge of sales of power shovels, including supervision of traveling salesmen and relation with branch offices and agencies, as well as development of new markets. Location Ohio. Z-778.

WORKS MANAGER OR PRODUCTION MANAGER to undertake general management of production of power shovels. Company has excellent organization of department heads but needs someone to coördinate various departments and develop big ideas which will result in increased production and decreased cost. Location Ohio. Z-779.

TWO ENGINEERING EDITORS who understand thoroughly technical trade-paper field to act as associate editors on *Blast Furnace and Steel Plant* and *American Drop Forger*. One to have some knowledge of iron and steel industry, and one versed on subject of forging and heat treating. We are enlarging our editorial staff considerably and can offer real opportunity to the men who have capabilities. Address Box 65, Pittsburgh, Pa. Z-788.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month preceding date of issue and should be limited to 45 words. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

PRODUCTION, INVESTIGATING OR COST ENGINEER: technical graduate with 10 years' experience in investigations, coördination, analysis of costs and routine, graphic reports, planning, standards, incentives and supervision. Now engaged. Desires to affiliate with prosperous industrial organization. SM-5144.

MECHANICAL ENGINEER; technical graduate; eight years' experience in factory management, small-parts manufacture, machine construction, plant maintenance and general construction, desires responsible executive position with possibilities for advancement. Knowledge of modern production methods. Has had actual shop experience and can obtain coöperation of men. Married. Prefers location within 100 miles of New York City. Salary $4000. SM-5145.

FOREIGN SALES REPRESENTATIVE; American; thirty-seven years of age; mechanical engineer, speaking Spanish, Portuguese, German fluently; ten years' sales experience in Latin America and Spain; desires to represent American firm in engineering specialties or machinery. Thoroughly acquainted with East and West Coasts of South America. At present employed as export manager large manufacturer. SM-5146.

SALES ENGINEER; technical graduate; eight years' experience in sugar machinery and associated lines, wishes to act as eastern and export representative of machinery manufacturers. Wide acquaintance in New York City and good connections in sugar-producing countries abroad. At present empolyed. SM-5147.

DESIGNER AND MECHANICAL ENGINEER; age 30; broad experience on machine and tool designing, processing of interchangeable machinery and setting of manufacturing limits. Ten years' experience; last four in executive capacity as chief draftsman. SM-5148.

FACTORY MANAGER OR GENERAL SUPERINTENDENT: graduate engineer; 20 years' practical experience, from apprentice to chief engineer and production manager, covering design, development and manufacture of intricate machinery, tools, instruments and high-grade specialties. Successful organizer, exceptional ability for getting best results. Reliable connection desired, either in established concern or new enterprise. Location immaterial. Age 39, minimum salary $6500 per annum. SM-5149.

COMBUSTION ENGINEER desires position experimental or engineering department; experienced in testing and installation of fuel-oil burners and equipment, aluminum-melting furnaces, core ovens. Age twenty-nine years; graduate Case School of Applied Science, mechanical engineering course. Prefer vicinity of Cleveland, but will consider other location. SM-5150.

MECHANICAL OR PLANT ENGINEER, technical graduate, excellent executive, successful in handling all classes of men, diplomatic and tactful. Eighteen years' experience in electrical and mechanical engineering including installation and maintenance, industrial plant, power, heating and lighting layout; organization and production engineering and purchasing. SM-5210.

MECHANICAL AND CONSTRUCTION ENGINEER: Cornell graduate; 33 years old; eight years' experience in design, construction, and operation of industrial and power plants; desires position with manufacturing organization, handling plant constructing, maintenance, and power-plant economy, or with engineering organization. SM-5152.

MECHANICAL ENGINEER; 34; experienced design, manufacture, inspection and construction heavy machinery; plate and structural work, timber and concrete; specialist mechanical handling, crushing, screening and storage of bulk materials; real executive ability; minimum salary $4000. SM-5153.

ASSISTANT TO WORKS MANAGER OR PRODUCTION ENGINEER, 5 years' experience covering inspection, planning, routing and scheduling of work. Past 3 years with U. S. Ordnance Department in charge of district activities. Opportunity considered in preference to salary. SM-5154.

MECHANICAL OR WORKS ENGINEER: American; age 34; married. Broad experience on factory layouts, equipment and maintenance work. Successful designer of high-grade automatic labor-saving machinery, dies, jigs and fixtures, pressed steel, printing presses, gas engines and machine tools; desires connection with progressive firm within 100 miles of Philadelphia. SM-5155.

ENGINEERING EXECUTIVE OR GENERAL MANAGER, age 35, Assoc. Mem., Mem. S. A. E., Mem. Nav. Arch. & Mar. Eng. Immediately available, 20 years' experience, office and shop, expert in application of anti-friction bearings lubrication, etc. Wide experience in turbine design and manufacture, fans and blowers, weighing apparatus, etc. Would consider sales position where engineering and manufacturing knowledge would prove of value. Salary $7000 to $10,000. SM-5156.

MECHANICAL RAILROAD ENGINEER, 15 years' experience in construction, improvement and maintenance of freight and passenger cars, locomotives and shops. Last 9 years on one of most progressive roads in direct and practical touch with car and locomotive departments. Age 38. Desires change account of consolidation curtailing initiative and responsibility and opportunity for advancement. SM-5157.

MECHANICAL ENGINEER; recent graduate; also university graduate in economics; at present employed by very large corporation on problems of production and design; four years' industrial experience, including industrial engineering; position desired with good opportunity for advancement in manufacturing industry or engineering work. SM-5158.

MECHANICAL AND ELECTRICAL ENGINEER; 20 years' experience; capable designer; has inventive ability, and can take charge of or organize an efficient drafting force; specialties: elevators, motor control apparatus and automotive equipment. Location, Newark or vicinity. Age 41, minimum salary $4000; excellent references. SM-5159.

MECHANICAL AND ELECTRICAL ENGINEER; age 38; two years' civil engineering course and six years' mechanical and electrical university course; 14 years' engineering experience in general construction. Thoroughly practical; executive ability. Desires change; no objection to foreign service if salary is commensurate with position and location. Minimum in United States, $4000. Will consider partnership on equal basis. Available on short notice. SM-5160.

MECHANICAL ENGINEER, with 12 years' experience in manufacture and design of automatic machinery and production tools, desires executive position or as experimental engineer. Employed at present; age 34, location immaterial. SM-5161.

ASSISTANT ENGINEER; technical graduate; age 30; married; experienced in power-house, foundry and general building design. At present assistant to engineer in charge with duties, estimating purchasing, supervising drafting and handling correspondence with field. Salary $300 per month. SM-5162.

MECHANICAL DRAFTSMAN; age 26; degrees in mechanical and aeronautical engineering. Over two years' machine-shop experience and one year assembly inspection on airplane engines; one year draftsman. At present assistant to manager in small manufacturing plant. Available on month's notice. SM-5163.

EXECUTIVE: factory or office; engineering sales or production; mechanical, textile, or chemical. Real practical successful experience in nearly every activity from drafting board to plant manager; technical education; age 40; now employed; available shortly at moderate salary. SM-5164.

ELECTRICAL-MECHANICAL MAN, experienced in duties of chief electrician, chief draftsman, assistant mechanical engineer, plant engineer and head of department of instruction. Understands manufacturing, installing and operating fields of small electrical-mechanical machines. Education, electrical-mechanical course, correspondence school, and Y. M. C. A. night school. Member Alexander Hamilton Institute course. American, married, 28 years old; prefers Eastern states; will consider Middle West. SM-5165.

MECHANICAL ENGINEER: technical and practical training; experienced in design of power stations, industrial plants, heating, ventilation, etc., also in field work and supervision of erection. Desires responsible position. SM-5166.

MANUFACTURING SUPERINTENDENT or plant engineer; 16 years' executive experience. Thorough mechanic, interchangeable or semi-interchangeable parts or tool work preferred. Assoc. Mem.; American; married. SM-5167.

MECHANICAL AND PLANT ENGINEER; American; age 43; married; 18 years' theoretical and practical experience in general plant-maintenance and construction, design of power houses and buildings, factory layouts and general equipment work executive. A-1 references. Vicinity of Newark preferred. Salary depends on position. SM-5168.

MECHANICAL ENGINEER; age 32; eleven years' engineering experience with large industrial plants and consulting engineers; general knowledge of plant maintenance, construction and layout. At present head of engineering department of large manufacturing plant. Desires position as asst. supt. or assistant to executive. Salary $4000. SM-5169.

MECHANICAL ENGINEER; technical graduate; three years' training in all phases of power-plant and refrigeration engineering. Four years on purely technical work involving use of higher mathematics, heat and experimental work; some design. Permanent position desired with possibility of advancement along executive lines, dealing with problems of design, power, refrigeration, lubrications, or research. Married, age 30. New England location preferred. SM-5170.

GRADUATE MECHANICAL ENGINEER; married; twelve years' exceptional broad practical experience. Desires permanent connection; Assoc. Mem.; Assoc. A.I.E.E. Technical apprentice machinery course, shop, office, sales; factory estimating, inspection, salvage, inventory and appraisal; purchasing and export experience; engineering inspection and testing; erecting engineer; production engineer; appraisals expert. Familiar with Latin America. Good health. Salary depends on location. Available thirty days' notice. SM-5171.

ENGINEER with broad experience in design, production, and sales of gearing and reduction gearing desires position with progressive concern. Minimum salary $3600. SM-5172.

MECHANICAL ENGINEER; graduate M. I. T.; married; 28 years old; with power plant and factory layout, installation and maintenance, production, inspection, purchasing, accounting and executive experience desires executive position preferably in manufacturing corporation or as assistant to an official. Available about July 1. SM-5173.

ENGINEERING EXECUTIVE; age 38; technical graduate; 17 years' experience in design, construction and management of indus-

trial plants, ore handling systems and power generation. Broad and varied experience gained with railroads, U. S. Gov't and industrial concerns in U. S. and foreign countries as designer, chief engineer, superintendent, etc. Salary $7000. Available May 1. SM-5174.

EXECUTIVE OF PROVEN ABILITY now successfully employed wishes to ascertain if any manufacturer feels need of developing ambitious worker to assume responsibilities of really worth while position. American, 32 years of age, married. Three years' technical education with ten years' practical experience. In present responsible executive position five years, with machine shop employing 700. Present salary $3600. SM-5175.

PURCHASING ENGINEER OR ASSISTANT MANAGER; age 35; single; technical graduate. Fifteen years' experience covering design, manufacture, purchase and sale of power-plant specialties and purchase of special machinery, iron and steel castings, forgings and steel-plate work. Location, New York City. No objection to some traveling. SM-5176.

TECHNICAL GRADUATE MECHANICAL ENGINEER; age 25; two and one-half years in shop and two years' executive experience. Desires position with concern offering good opportunities for advancement. Salary secondary matter. SM-5177.

INDUSTRIAL MANAGER OR SUPERINTENDENT; trained executive who is technical graduate; Assoc.; with twelve years' practical experience in foundry and accurate machine-shop work including progressive assembly. Has kept abreast of recent developments in methods for handling men. Able to coördinate and secure team work. Age 34 and married. SM-5178.

SUPERINTENDENT OR WORKS MANAGER; 15 years' experience from apprentice to present position as general superintendent of machine-tool and special machinery factory; ability as executive, estimator and business getter proven. Salary $5000. SM-5179.

INDUSTRIAL ENGINEER; technical graduate; age 30; six years' experience designing heavy machinery, labor-saving and safety devices, power plants, piping, heating and ventilating and estimating; two and a half years' of efficiency work; thoroughly familiar with planning, scheduling, routing, time study and cost accounting; neat and accurate draftsman; with present firm 2½ years; desires change. Location immaterial. SM-5180.

MECHANICAL ENGINEER; experienced in design, construction and maintenance of power plants, mills and factories desires connection in executive capacity with established concern or as organizer in new enterprise of reliable financial backing. Would act as valuation investigator for financial institution. Twenty years' experience. Age 45. References furnished. New York and New Jersey Metropolitan district preferred. SM-5181.

CIVIL AND MECHANICAL ENGINEER; Captain, Construction Division, U. S. Army, in charge of construction, will be available after discharge from Army June 30, 1920; good executive ability; capable of taking charge of layout, surveys, plans, estimates and construction of industrial works, railroads, sewer and water systems, roads, etc. SM-5182.

PROCESS ENGINEER, capable, technical and practical man, with considerable experience in varied industries, possessing ingenuity and natural executive ability solicits correspondence, in preference to either temporary or permanent work. SM-5183.

MECHANICAL ENGINEER; 20 years' practical experience as mechanic and engineer, from apprentice to executive, covering design of railroad equipment, buildings, shops, test work in general, machine-tool design, labor-saving and production machinery, die casting and mould design; past three years engaged in electro-storage manufacturing. Age 36. Married. Salary $5000. SM-5184.

GENERAL OR WORKS MANAGER; executive with broad experience in plant management; good organizer, producer and thorough mechanic, who has been very successful in handling large force of men in manufacture of high-grade machinery, and on diversified manufacturing, will be open to consider good proposition about June or July. Now liquidating business of firm he represents. SM-5185.

ASSISTANT TO PLANT SUPERINTENDENT desires position as assistant engineer of service, production or sales; experienced on paper working machinery, cranes, hoists and marine auxiliaries. Age twenty-eight. Location, New York City or vicinity preferred. SM-5186.

TECHNICALLY TRAINED ENGINEER; age 27; married; has been with controller manufacturer for past three years; has held executive position with this company; is thoroughly competent to install and to take charge of crane-control equipments; middle west location preferred. Salary to start $250 a month. SM-5187.

SALES ENGINEER; technical graduate; 30 years of age; unmarried. Manufacturing and engineering experience upon gas-producers, internal-combustion engines, pumps, gas-plants, electrical motors, generators, and transformers. Held important engineering position in U. S. Army. At present assistant to well-known consulting engineer, but intends to devote himself to sales work. Middle West or South preferred. SM-5188.

MECHANICAL ENGINEER; technical graduate; age 36; twelve years' experience as designer and chief engineer in charge of design and construction of stationary gas engines and Diesel motors; desires to communicate with responsible parties who contemplate engaging in manufacture of Diesel engines. SM-5189.

SALES MANAGER or assistant to executive of manufacturing concern; age 30; University of Pennsylvania, 1912. Vicinity of Philadelphia preferred. SM-5190.

SAFETY ENGINEER; graduate mechanical engineer; age 33; has specialized six years along safety engineering lines, insurance-company inspection work, and safety engineering at large manufacturing plant. At present employed in middle west, but desires to locate in eastern states. Salary desired $3000. SM-5191.

MECHANICAL ENGINEER; production man; first rate designer; 15 years' experience general engineering; all-round, resourceful, economical man of push, ideas and creative ability; can stimulate output and quality; desires executive position in large or medium concern. $3600. SM-5192.

PETROLEUM ENGINEER; practical mechanical engineer, Member, with 12 years' experience as chief engineer in refinery, pipe lines, asphalt and gasoline-plant designing and operation, and specialist on continuous refining and cracking plants, is open for engagement as manager or engineer. SM-5193.

CONSULTING ENGINEER with over 25 years' experience on great buildings of New York and other U. S. cities, desires to make engagement as efficiency engineer to large engineering or contracting firm. Has had large experience with power houses, steam boilers, underground steam and hot water distribution, steam heating and ventilation and hot and cold domestic water supply and all domestic engineering, for great groups of buildings, and tunnel and underground work, etc. SM-5194.

MECHANICAL ENGINEER; age 35; member; educated at M. I. T. Recent captain of Ordnance. Ten years' practical experience from draftsman to executive covering building construction, estimating, sales engineering, conveyor designing, installation, production and manufacture interchangeable parts, etc. At present employed in charge of maintenance, power plant and production. Minimum salary $4500. SM-5195.

MEMBER OF A.S.M.E. and Society of Naval Architects and Marine Engineers, graduate of Mass. Institute of Technology, with sixteen years' practice in mechanical engineering and ship-building, now returning from six months' study of commercial conditions in Northern Europe, will soon be free to make new connections in commercial engineering or related business. SM-5196.

ASSISTANT TO CHIEF ENGINEER, EXECUTIVE, or SALES; Harvard graduate; married; 9 years' engineering and executive experience, hoisting, conveying, power-transmission, and coal-handling apparatus. SM-5197.

MECHANICAL ENGINEER; 1915 graduate with miscellaneous machine-shop experience; estimating on purchase and installation of general mill equipment; specifications; heating and ventilating; miscellaneous research work; desires position with advancement opportunities. No drafting, combustion, or plant-maintenance work. At present employed; single; references. Western Penn preferred but will consider any location. SM-5198.

MASTER MECHANIC OR SUPERINTENDENT OF POWER; Associate Member; 15 years' experience in machine-shop, industrial-plant, and mechanical departments of railroad. Specialized in power-plant installations, operation and maintenance. At present employed in executive position. Desires connection preferably with industrial engineering company or industrial plant. Salary $3600 or commensurate with position offered. SM-5199.

MECHANICAL ENGINEER; age 39; member; expert in all usual and many unusual cases of generation and application of steam power (stationary) and heat; available any time for American engagement by owners, engineers, architects or promoters of such plants. Temporary engagements solicited. SM-5200.

PLANT OR MAINTENANCE ENGINEER: age 30, single. Several years in industrial plants as maintenance engineer, master mechanic and mechanical superintendent. At present employed. SM-5201.

PROFESSOR OF MECHANICAL ENGINEERING in southwestern university desires similar position for school year commencing in September. Has had ten years of teaching experience and has specialized in problems of combustion. Age 33, married. SM-5202.

GRADUATE MECHANICAL ENGINEER; 25; married; and at present employed in chemical plant as assistant to works engineer. Desires connection with firm of consulting engineers in capacity of mechanical engineer along commercial lines. Over two years' experience, some appraisal and purchasing work. Location New York City. Present salary $2600. SM-5203.

MECHANICAL ENGINEER; college graduate, eighteen years' experience as designer, estimator and engineer. Experienced in steam shovels, dredges, dry-land ditching machines, locomotive cranes, derricks, hoisting engines, tractors and general machinery. Machine-shop, gray-iron and steel-foundry practice. At present assistant professor of engineering mathematics in high-standing university. Desires position from July 1 to October 1. Middle Western location preferred. SM-5204.

SALES MANAGER OR DISTRICT MANAGER—Member; seven years' broad business experience as manufacturing executive and sales manager, both in specialty and staple lines. Graduate engineer with good early training, including extensive travel on engineering work. Right personality for substantial representation. Age 34. Married. Eastern location preferred. SM-5205.

TECHNICAL GRADUATE experienced in design, operation and construction of oil and gas-burning metallurgical and industrial furnaces. Familiar with refractories and fuels. Has been connected with development work in producer and blue gas. At present in responsible charge of similar work. Desires to connect with company offering larger opportunities. Has had experience in general engineering and office routine. Age 34. Minimum salary $4500. SM-5206.

EXECUTIVE ENGINEER; age 46; married; Lehigh University graduate in mechanical engineering; at present employed. Varied experience in mechanical, civil and electrical engineering in executive capacities in direction of operations working both technical and commercial, and including design, construction and management. Possesses initiative and foresight. Wishes position of responsibility. Salary $5000 to $6000. SM-5207.

SALES OR BRANCH MANAGER, member, thirty-six, exceptional experience domestic and export, all departments, machinist to manager. Aggressive, constructive type, forceful but diplomatic, securing hearty coöperation all departments. To firm needing man with keen analytical powers, and record as dividend producer, writer offers services. SM-5208.

TEACHER OF MECHANICAL AND INDUSTRIAL ENGINEERING at present teaching in one of largest State universities desires position in college or university in Middle West or West. Ten years' engineering and teaching experience. Age 33, married. Member of A. S. M. E. and S. P. E. E. SM-5209.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER APRIL 18, 1920

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 196.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by April 18, 1920, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

BARNARD, GEORGE R., Draftsman, Montgomery Coal Washing & Manufacturing Co., Birmingham

California

BLAISDELL, SIDNEY B., Lieutenant (jg) U. S. Navy, U. S. S. New Mexico, San Francisco

TJEENK WILLINK, ALEXANDER H. J., Shell Co. of California, Martinez

Connecticut

AVERY, NATHAN C., Planning Engineer T[illegible] New Britain Machine Co., New Britain

AYRES, RUSSELL W., Research Engineer, Yale & Towne Manufacturing Co., Stamford

BEERS, HENRY S., Columbia Graphophone Manufacturing Co., Bridgeport

BRUEMMER, CHARLES H., Manufacturing Engineer, American Hardware Corp., New Britain

CLARKE, IVENSON B., Commercial Engineer, Ayer-O'Connell Manufacturing Co., Meriden

GOUGH, WILLIAM E., Proprietor, Shelton Machine Co., Shelton

HARMON, HOYT H., Assistant Engineer, Naugatuck Chemical Co., Naugatuck

HOLMQUIST, GEORGE F., Engineer, Marlin-Rockwell Corp., Bristol

KENNEDY, SYLVESTER, President, The Roberts Manufacturing Co., New Haven

MITCHELL, WILLIAM P., The Whitlock Coil Pipe Co., Hartford

MORRIS, WILLIAM O., Engineer & Assistant General Manager, The Connecticut Blower Co., Inc., Hartford

PORTER, ROBERT B., Engineer, Motor Car Division, American & British Manufacturing Corp., Bridgeport

THOMPSON, GEORGE B., General Production Foreman, Colt's Patent Fire Arms Manufacturing Co., Hartford

VIALL, WENDELL P., Mechanical Draftsman, The American Brass Co., Waterbury

ZIEGLER, WILLIAM G., Plant Engineer, Pratt & Whitney Co., Hartford

District of Columbia

BOND, ALLISON H., Leading Draftsman, Ordnance Department, Artillery Division, Ry. & Seacoast Carriage Section, Washington

GUETH, OSWALD, Instructor Mechanical Engineering, Catholic University, Washington

KEAT, WILLIAM G., Ordnance Computer, Navy Yard, Washington

Georgia

HOLBY, WORRELL H., District Manager, S.K.F. Industries, Inc., Atlanta

QUATTLEBAUM, HARROLD H., Draftsman, R. D. Cole Manufacturing Co., Newman

Illinois

ASPROOTH, AXEL H., Chief Engineer, Cotta Transmission Co., Rockford

BLATCHFORD, JOHN, Consulting Engineer, Simonds Manufacturing Co., Chicago

BOYLE, JOHN R., Installing Engineer, The Isko Co., Chicago

FINNEGAN, JOSEPH B., Associate Engineer, Underwriters' [illegible]tories, Chicago

FRANK, [illegible] M., Joseph T. Ryerson & Son, Chicago

JAMISON, WILLIAM W., Joseph T. Ryerson & Son, Chicago

McALEENAN, HOWARD WM., Mechanical Engineer, Automatic Carbonia Machine Co., Peoria

MULLALLY, WALTER J., Plant Engineer, American Manganese Steel Co., Chicago Heights

RAPP, AXEL G. J., Engineer, Link-Belt Co., Chicago

WASBAUER, ALFRED M., Designing Engineer, Ingersoll Milling Machinery Co., Rockford

WEDDELL, Ralph R., Machine Designer, H. H. Hood, Chicago

Louisiana

WILLIAMS, DAVID T., District Manager, Southern District, U. S. Shipping Board, Emergency Fleet Corp., New Orleans

Maine

SMITH, ARTHUR D., Factory Engineer, National Metal Seal Corp., Portland

Maryland

DAVIS, WILLIAM H., Installation Engineer, American Can Co., Baltimore

SOMERS, RICHARD H., Colonel, Ordnance Department, U. S. Army, Aberdeen Proving Grounds, Aberdeen

TOWSON, JOSEPH P., Draftsman, Bethlehem Ship Building Corp., Ltd., Sparrow Point

WHITELEY, STOCKETT M., Mechanical Engineer, The Fairbanks Co., Baltimore

Massachusetts

ANDERSON, J. ELMER, Planning (Tool Division) Hendee Manufacturing Co., Springfield

ASPEY, JOSEPH H., Mechanical Engineer, Cooley & Marvin Co., Boston

BAASE, FRED J., Superintendent Master Block Department, Wilton Tool & Manufacturing Co., Roxbury

BITNER, LAURENCE S., Director of Personnel, Wm. Kilene's Sons Co., Boston

BOHLIN, JOHN H., Draughtsman, Morgan Construction Co., Worcester

BROSTEDT, CARL W., Machine Designer, Bausch Machine Tool Co., Springfield

COLLYER, CHARLES F., Draughtsman, Morgan Construction Co., Worcester

DENNEN, WALTER B., Draftsman, Norton Co., Worcester

ESTES, FREDERICK A., Appraiser, Associated Factory Mutual Fire Insurance Companies, Boston

FAY, FRED B., Rolling Mill & Special Machinery Designer, Morgan Construction Co., Worcester

GRUBE, LESTER E., Assistant Engineer, General Electric Co., Lynn

JACOBSON, HENRY A., Assistant Chief Draftsman, Leland-Gifford Co., Worcester

KAYSER, WENDELL H., Draftsman, Experimental Department, United Shoe Machinery Co., Beverly

KENWAY, HERBERT W., United Shoe Machinery Corp., Beverly

MALM, GEORGE P., Draughtsman, Morgan Construction Co., Worcester

PAISLEY, JOHN K., Assistant Appraisal Engineer, American Agricultural Chemical Co., Boston

PIPER, EDGAR R., Head of Department Drawing & Design, Wentworth Institute, Boston

ROBBINS, WILLIAM F., Master Mechanic, Hood Rubber Co., East Watertown

ROSS, JOHN O., Manager, Drying Department, B. F. Sturtevant Co., Hyde Park

SNYDER, WALTER W., Assistant Superintendent, Rice, Barton & Fales Machine & Iron Co., Worcester

TOLLEY, CLINTON G., Engineer, Arthur D. Little Co., Inc., Cambridge

TRIPP, EDWIN P., Mechanical Engineer, McClintock & Craig, Springfield

WILSON, GEORGE E., Draughtsman, Morgan Construction Co., Worcester

Michigan

CUTMORE, CHARLES M., Tool Designer, General Motors Corp., Detroit

DuBOIS, GUSTIN T., Vice President & General Manager, Eastern Production Co., Detroit

EVANS, GORDON M., Manager, Aluminum Manufacturers Co., Detroit

FISHER, W. REUEN, Chief Engineer, Wright Fisher Engineering Co., Detroit

MASON, ROBERT E., Test Engineer, Buick Motor Co., Flint

NELSON, MINTON S., Draftsman, The Wickes Boiler Co., Saginaw

SEE, JAMES S., Production Engineer, Industrial Works, Bay City

STARBIRD, WINFIELD D., Sales Engineer, The Prescott Co., Menominee

WATKINS, JAMES A., Research Engineer, American Blower Co., Detroit

WARMINGTON, THOMAS J., Assistant Chief Draftsman, The Wickes Boiler Co., Saginaw

WILLOUGHBY, GEORGE A., Shop Manager, Arthur Hill Trade School, Saginaw, W. S.

Minnesota

WUNDERLICH, MILTON S., Post Graduate, Research Scholarship, Flexlinum Insulating Co., St. Paul

Missouri

KRAMER, ANDREW A., Proprietor, Columbian Steel Tank Co., Kansas City

Nebraska

BOURKE, NORMAN T., Power Plant Inspector, Union Pacific R. R., Omaha

THERKELSEN, JOHN, Superintendent, Ward Manufacturing Co., Lincoln

New Jersey

BELLIS, ALFRED P. S., General Superintendent, John A. Roebling's Sons Co., Trenton

ENTWISLE, HAROLD F., Assistant Chief Draftsman, The Celuloid Co., Newark

FERBER, WILLIAM, Assistant Supervisor, Instrument Division, Keuffel & Esser Co., Hoboken

GINTER, GEORGE E., Master Mechanic, Babcock & Wilcox Co., Bayonne

LUM, SAMUEL C., JR., Sales Engineer, Oxweld Acetylene Co., Newark

LUNDGREN, GUSTAVE A., General Foreman, The Celluloid Co., Newark

McCUTCHEON, ANDREW, Department Manager, The Singer Manufacturing Co., Elizabethport

MATTERN, J. C., Equipment Engineer, The Singer Manufacturing Co., Elizabethport

MEYER, PETER, President, Doeger-Meyer Machine & Tool Co., Newark

PENN, MARION, Plant Engineer, Public Service Electric Co., (Re-election), Newark

WEYRAUCH, HERMAN, Inspector of Ordnance, Singer Manufacturing Co., Elizabeth

YATES, EDWIN T., Gear Engineer, Newark Gear Cuting Machine Co., Newark

ZEPFLER, LOUIS H., Fuel Oil Engineer, Standard Oil Co. of N. J., Elizabeth

New York

ADAMS, HENRY A., Jr., Indian Manager, Walworth International Co., New York

BARNARD, NORRIS C., Die Designer, Doehler Die Casting Co., Brooklyn

BARNHART, CLARENCE D., Assistant Secretary & Sales Engineer, W. S. Rockwell Co., New York

BARSKY, GEORGE, Bridgham Fellow, Columbia University, New York

BERGER, ALFRED R., Mechanical Superintendent, Chelsea Fibre Mills, Brooklyn

BRANDIS, WILLIAM F., Jr., Secretary & Industrial Engineer, Brandis & Son, Inc., Brooklyn

BROWN, JAMES A., Engineer, W. S. Rockwell Co., New York

BURGESS, HARRY R., General Manager, F. S. Burgess Son & Co., Elmira

CALKINS, JAMES B., Plant Engineer, Columbian Rope Co., Auburn

CRANE, HENRY M., Consulting Engineer, New York

DOUGHERTY, THOMAS, Assistant Sales Manager, C. J. Tagliabue Manufacturing Co., New York

EVANS, GILBERT H., Assistant Superintendent, The Flatbush Gas Co., Brooklyn

FEENEY, FRANK A., Assistant Manager of Purchasing Department, Allied Machinery Co. of America, New York

FISKE, WARREN M., Student Lubricating Engineer, The Texas Co., New York

HEMENWAY, LOWELL W., Chief Tool Designer, Nathan Manufacturing Co., Flushing, L. I.

HENSCHEL, Edward G., Estimating Engineer, Allied Machinery Co., of America, New York
JACKSON, Alexander F., Service Manager, Oakland Motor Car Co., Long Island City
JACOBI, Edmund W., Sales Engineer, Osborn Manufacturing Co., Brooklyn
KETCHER, Randolph E., Draftsman, The Terry & Tench Co., Inc., New York
LINDNER, Karl A., Mechanical Designer, Chile Exploration Co., New York
MATCHETT, Thomas, Vice President & General Manager, Robins Conveying Belt Co., New York
MATTHEWS, Reginald G., Estimating Engineer, Allied Machinery Company of America, New York
MEINECKE, Paul F., Tool Machine Designer, American Everready Works, Long Island City
MERKER, David, Mechanical Engineer, Otis Elevator Co., New York
PURCELL, Thomas E., Engineer, General Electric Co., New York
SAXE, John L., Jr., Machine & Tool Appraiser, N. Y. District, Salvage Board Ordnance Department, New York
SMITH, Ralph R., Chief Draftsman, Smith Premier Works, Remington Typewriter Co., Syracuse
STEVENSON, Harry, Methods Superintendent, The Sperry Gyroscope Co., Brooklyn
TRASK, Charles H., Chief Engineer, U. S. S. Teal, New York
TWOMBLY, Frank W., Sales Engineer, Buffalo Forge Co., Buffalo
VOLTMANN, Henry J. N., Engineer, W. S. Rockwell Co., New York
WEBSTER, Harold S., Draftsman, Doehler Die Casting Co., Brooklyn
WHEELER, Jay C., District Manager, Kerr Turbine Co., Wellsville
WHITE, Bryon E., Utica Gas & Electric Co., Utica
WIENER, Raymond L., New York
WOODWARD, Edgar L., Associate Editor, Railway Mechanical Engineer, New York

Ohio

CRAWFORD, John D., Jr., Tool Designer, National Supply Co., Toledo
HOEFINGHOFF, Arthur C., President & General Manager, The Cincinnati Grinder Co., Cincinnati
KENT, Bert M., Patent Counsel, The Standard Parts Co., Cleveland
KIMMEL, George C., Vice President & Mechanical Engineer, Cincinnati Grinder Co., Cincinnati
KING, Eldred L., Designer, National Supply Co., Toledo
LOEW, Charles F., Efficiency Engineer, Philadelphia Rubber Works Co., Akron
McCULLOUGH, William T., Jr., Sales Engineer, The Babcock & Wilcox Co., Cincinnati
McEWEN, John D., Checker, Youngstown Pressed Steel Co., Warren
McGEE, W. A., Mechanical Engineer, N. Y. C. R. R., Cleveland
McKEE, Willis, Manager, Mill Department, Arthur G. McKee & Co., Cleveland
McLAUGHLIN, Steve D., Engineer, Erie Tire & Rubber Co., Sandusky
PAQUE, E. J., Works Engineer, The Pollak Steel Co., Cincinnati
TONNE, Carl A., Demonstrator & Field Engineer, R. K. LeBlond Machine Tool Co., Cincinnati

Oklahoma

HARTRANFT, Horace J., Assistant Superintendent, Transcontinent Oil Co., Tulsa

Pennsylvania

ANDREWS, Roger W., Secretary & Treasurer, Andrews-Bradshaw Co., Pittsburgh
BOWLEY, Joseph W., Instructor in Mechanical Engineering, Drexel Institute, Philadelphia
CHAPMAN, Cyril T., Sales Engineer, Ingersoll-Rand Co., Scranton
COOKE, A. F., General Manager, Fawcus Machine Co., Pittsburgh
DOWELL, Downson, Assistant Professor Mechanical Engineering, Drexel Institute, Philadelphia
FLICK, Louis V., Engineer, The Barrett Co., Philadelphia
FLORCYK, Edward M., Designer, Bethlehem Steel Co., Bethlehem
FREEDLEY, Paul, Member of Firm, McGee & Freedley, Philadelphia
GARRETT, Robert E., Assistant District Sales Manager, Gulf Refining Co., Philadelphia
KAY, Frank W., Head of Planning Department, American Engineering Co., Philadelphia
KENNEDY, Frank J., Machine Shop Superintendent, National Metal Moulding Co., Ambridge
KENNEDY, Fred I., Jr., Partner, Good Roads Construction Co., Erie
LANDIS, William C., Machine Designer, Westinghouse Air Brake Co., Wilmerding
LESSIG, Hilary M., President & General Manager, Sotter Bros., Inc., Pottstown
LYNN, John M., Draftsman, Homestead Steel Works, Munhall
NEWELL, Harry B., Works Manager, Fawcus Machine Co., Pittsburgh
ODENATH, Harry E., Construction Engineer, Barrett Co., Frankford, Philadelphia
SCHAFFNIT, William E., Instructor in Mechanical Engineering, Drexel Institute, Philadelphia
SHERWOOD, Lyman W., Engineer, Vulcan Oil Refining Co., Coraopolis
WILSON, Edward F., Chicago Pneumatic Tool Co., Franklin

Rhode Island

MILLER, Charles F., Foundry Superintendent, Universal Winding Co., Providence

South Carolina

WEAVER, Charles W., Engineer, Charleston Consolidated Railway & Lighting Co., Charleston

Tennessee

GALLAGHER, John J., Superintendent Boiler Department, Lucey Manufacturing Co., Chattanooga

Texas

STRAHAN, Ernest K., Manager of New Orleans Office, York Engineering & Supply Co., Houston

Washington

DUDLEY, William L., Vice President, Western Blower Co., Seattle
FITZPATRICK, J. M., Manager, Union Iron Works, Spokane
IRVING, Adam H., Mechanical Engineer, Union Iron Works, Spokane
MacCAMY, Harry J., Mechanical Engineer, Union Iron Works, Spokane
NOLAND, Roscoe C., Machinist (T) U. S. Navy, U. S. S. Charleston, Bremerton
ROSSOE, Olav C., General Manager & Vice President, Gulowsen Grei Engine Co., Seattle

West Virginia

BROOKS, John E., Estimator, U. S. Navy, Ordnance Plant, Charleston

Wisconsin

ALTPETER, Frank C., Engineer of Construction, A. O. Smith Corp., Milwaukee
BORN, Frank J., Mechanical Engineer, Milwaukee Die Casting Co., Milwaukee
WIKLE, George F., Designing Engineer, A. O. Smith Corp., Milwaukee

Canada

BEAUSOLEIL, Raymond J., Efficiency Engineer, St. Lawrence Sugar Refineries, Ltd., Montreal

England

HALER, Percy J., Principal, Leyton Technical Institute, Leyton, Essex

France

GOODE, Curtis B., Ste Fondations Constructions, Paris

Italy

GALEAZZI, Roberto, Efficiency Engineer, Soc. An. St. Gio Ansaldo & Co., Genoa
Previously posted in error as President.

New Mexico

CALDWELL, David D., Chief Engineer, Deming Ice & Electric Co., Deming

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

Illinois

SCHAKEL, J. D., Chief Engineer, Elevator Company of America, Chicago

Kentucky

BEEBE, Murray C., Chief Engineer, Wadsworth Watch Case Co. (Reinstatement), Dayton

PROMOTION FROM ASSOCIATE-MEMBER

Illinois

GOOLEY, Joseph E., Head of Mechanical Department, Imperial Brass Manufacturing Co., Chicago

Massachusetts

EIDMANN, Frank L., Mechanical Engineer, Cowan Truck Co., Holyoke
STREETER, Claude O., Production Manager, Graton & Knight Manufacturing Co., Worcester

New York

ARNTZEN, Asbjorn, Assistant Mechanical Engineer, F. L. Smith & Co., New York
MURPHY, Ralph, Chief Engineer, H. H. Franklin Manufacturing Co., Syracuse
SOWDEN, Parkin T., Director & Assistant General Manager, Arkell & Smiths, Canajoharie

Texas

FARRINGTON, Thomas H., Superintendent, Contractors Oil Co., Burkburnett

PROMOTION FROM JUNIOR

Michigan

PAUGH, Charles T., Assistant Plant Equipment Engineer, Hudson Motor Car Co., Detroit

New Hampshire

LILLA, Herbert L., Chief Engineer, U. S. S. Grebe, Portsmouth

New York

MILLER, Philip F., Department Sales Manager, DeLaval Separator Co., New York

Ohio

BLEYER, Charles F., General Foreman, The National Tube Co., Lorain

Pennsylvania

GOETZENBERGER, Ralph L., Major, Ordnance Department U. S. A., Frankford Arsenal, Philadelphia
MYERS, Curtis C., Assistant Mechanical Engineer, Aluminum Company of America, Pittsburgh

Washington

RUSSELL, Foster, Manager, Symons Russell Aviation Co., Spokane

Dominion Republic

NADLER, Harry A., Factory Superintendent, Central Romana, LaRomana

SUMMARY

New Applications	179
Applications for Change of Grading:	
Promotion from Associate	2
Promotion from Associate-Member	7
Promotion from Junior	8
Total	196

SUMMARY SHOWING AVERAGE AGE AND POSITIONS OF APPLICANTS ON BALLOT CLOSING MARCH 22, 1920.

Average age of Applicants:	
Members	39
Associates	38
Associate-Members	30
Juniors	24
Chemical Engineer	1
Chief Engineers	11
Designers	4
Assistant Designer	1
Designing Engineers	2
Marine Draftsman	1
Draftsmen	16
Chief Draftsmen	8
Mechanical Draftsman	1
Engineers	14
Efficiency Engineers	2
Executives (Pres., V. Pres., Secy. Treas., Mgrs.)	20
Fuel Engine[illegible]	1
Industrial E[illegible]	4
Inspector	1
Lieutenant	1
Master Mechanics	3
Mechanical Engineers	16
Asst. Mechanical Engineers	6
Plant Engineers	2
Production Engineer	1
Professor	1
Resident Engineers	2
Safety Engineer	1
Sales Engineers	7
Service Engineer	1
Superintendents	10
Asst. Superintendents	3
Traveling Engineer	1
Miscellaneous	49

In Two Sections—Section Two

Volume 42 Number 5

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

MAY 1920

A. S. M. E. Affairs

PUBLISHED MONTHLY BY THE SOCIETY
29 WEST 39TH STREET, NEW YORK, U.S.A.

Organizing Conference of Engineers

Washington, D. C., June 3 and 4

THE Joint Conference Committee has issued a call to the engineering profession of the United States for an Organizing Conference to be held in Washington, D. C., June 3 and 4. This conference is being called for the purpose of effecting closer coöperation of local and national technical and allied organizations; to further the public welfare wherever technical knowledge and engineering training are involved; and to consider matters of common concern to these professions.

This action is taken pursuant to a resolution unanimously passed January 23, 1920, at a joint meeting of the governing boards of the Founder Societies and of the American Society for Testing Materials, the Trustees of the United Engineering Societies, and members of the Engineering Council. The resolution has been characterized as "the biggest item of news of its kind in the engineering history of this country". The engineering profession must now rise to the occasion. By united action they can realize the long-cherished ideal—a comprehensive organization dedicated to the service of the city, state and nation.

Spring Meeting, St. Louis, May 24-27

Headquarters at the Hotel Statler

THIS year's Spring Meeting promises to be one of the most attractive the Society has ever held. The Committee on Meetings and Program, in addition to the usual technical sessions, has planned for excursions to the world-famous water-power development on the Mississippi at Keokuk, and to Tulsa, the Hub of the Industrial Southwest. There will also be an opportunity to visit several of the leading industrial plants of St. Louis.

The technical features will cover a wide variety of topics—Mississippi River Transportation Problems; Housing; Appraisal and Valuation; Pulverized Coal Uses; Aeronautics; and Foundry Practice. If you are planning to attend the Spring Meeting, be sure to fill in and send to the Secretary the coupon facing page 263.

Coming Section Meetings

Atlanta Section. May 25: At the Carnegie Library Reading Room. Subject: Manufacture of Cotton Goods, by J. T. Wikle of Atlanta, Georgia.

Baltimore Section. May 7: At the Engineers' Club. Subject: Some Recent Developments in Heating and Ventilation, by Prof. John R. Allen of Pittsburgh, Pa.

Chicago Section. May 21: Luncheon and Excursion—probably to the works of the Western Electric Company.

Colorado Section. May (date to be announced): Joint Meeting with Sections of the National Societies, to be held in Boulder, Colo. Speaker to be announced later.

New Haven Branch. May 12: At the Mason Laboratory, Scientific School. Subject: Airplanes. Speaker to be announced.

Mid-Continent Section. May 28-29: Joint meeting A.S.M.E. and Oklahoma Section of American Chemical Society.

New York Section. May 11: At Engineering Societies Building. Subject: Symposium on Cost Accounting.

Ontario Section. May (date to be announced). In Hamilton. Expect to visit works of Canadian Westinghouse Company and furnaces, smelters and mills of the Steel Company of Canada.

Philadelphia Section. May 25: Annual Dinner at the Philadelphia Engineers' Club. Several prominent men will speak, and past chairmen will give short talks.

San Francisco Section. May (date to be announced). Joint meeting with Leland Stanford and Berkeley University Student Branches.

Washington, D. C., Section. May 17: At the Bureau of Standards in Industrial Building. There will be an exhibit of gas and electric welding at 5.30, a dinner at 6.30, with a short talk on "Should Junior Members Vote?" and a professional session at 8 p. m. on Gas and Electric Welding.

SOCIETY AFFAIRS

Secretary's Letter—Professional Sections—A. S. M. E. Council Meeting—Changes in Constitution, By-Laws and Rules—Report of the Special Committee on Committees—Personals—Necrology —Section Meetings—Employment Bulletin—Candidates for Membership

The Secretary's Letter

THE accompanying foreword, just written by Dr. Henry Van Dyke, our distinguished author and former ambassador, referring to a local activity of the medical profession, is equally applicable to the members of the engineering profession in connection with their civic activities in local societies and sections:

> If the people of the community who are thoroughly good in themselves would also be good for others, they would have power to lift up the whole tone of life and would be ten times more happy and more useful. Doing one's duty on the side of the neighborhood leads to the best results on the side of personality.
>
> The drop of good-will in all our experiments! The touch of kindness in all our efforts! The purpose of beneficence in all our plans. For a year, a month, even a week, do you think we can do it?

On Sunday, April 11, I attended the wonderful tribute paid to our beloved honorary member and past-president, Uncle John Brashear, by the citizens of Pittsburgh.

An account of the memorial service, at which the attendance was variously estimated from 6,000 to 10,000, appears in another column. The comment which summarized the opinion of many was given by one of Pittsburgh's leading citizens, who said, "This tribute shows that it is still worth while to lead a kindly life." Another said, "His eminence was the result of his goodness, his simplicity, his humility and his servitude to man."

In Washington, May 6 and 7, I believe, the Interprofessional Conference is to hold another meeting and still further try to get the members of all the professions to rid themselves more and more of self-interest, and to maintain the highest ideals of professional men through the use of their talents for the service of others.

In June, also in Washington, will be the conference of all the engineering societies of the United States, called by the Joint Conference Committee.

Engineers have a tremendous responsibility in their ambition to merit public confidence and regard, and only by making it apparent that their public services are of greater concern than their private interests can they take rank with the other professions. I am bound to believe that much of the advance in the prestige of the engineering profession in the progress of the war is due to the unselfish character of the work performed rather than to the contribution of technical skill which the engineer is peculiarly equipped to furnish.

Every one who can attend the engineer's conference and contribute to the high standard which is the impelling motive for this inclusive coöperative movement, should do so.

Calvin W. Rice,
Secretary.

Council of A. S. M. E. Adopts Resolution Regarding Metric System

Recently a number of articles have appeared in various publications stating in effect that The American Society of Mechanical Engineers had placed itself on record as being opposed to the metric system. This matter was presented to the Council of the Society and the following resolution was adopted:

> *Resolved:* That this Society, as a Society, does not and has not taken any stand in favor of or against the metric system, that notice to this effect be published in The Journal of the Society, Mechanical Engineering, and that this fact be given such further publicity as may be approved by the President.

It was the unanimous opinion of the members of the Council both at the meeting in Baltimore on February 27 and at the March 19th meeting that while members of the Society and of the Council might properly and would naturally hold various opinions regarding the metric system and its introduction here, it was not advisable nor desirable that the Society place itself on record either for or against the system or its introduction and it is not desired that publications shall appear representing that the Society has taken any such position.

1920 Nominating Committee

In the last issue of Mechanical Engineering, the date of May 1 was set as a last date for receiving suggestions of names to fill the elective offices in the Society.

However, on account of the times it is necessary to allow a few days' extension on all dates, and the Nominating Committee will be glad to receive such suggestions if the members will mail them in as soon as possible. Any suggestions may be sent to the Secretary or to the following addresses: H. P. Fairfield, Worcester Polytechnic Institute, Worcester, Mass.; George K. Parsons, 29 Pine St., New York City; George A. Weschler, Catholic University of America, Washington, D. C.; E. H. Whitlock, 910 American Trust Building, Cleveland, Ohio; George W. Galbraith, 1504 First National Bank Building, Cincinnati, Ohio; C. B. Lord, 5575 Chamberlain Ave., St. Louis, Mo.; Robert Sibley, 171 Second St., San Francisco, Cal.

Professional Sections

The Special Committee on Professional Sections has now been organized and the following is the personnel of the Committee:

Howard E. Coffin, Detroit, Mich	*Aeronautics*
Francis W. Kelly, Albany, N. Y.	*Cement*
David M. Myers, New York	*Fuel*
George A. Orrok, New York	*Gas Power*
Henry J. Eberhardt, Newark, N. J.	*Machine Shop*
Robt. H. Fernald, Philadelphia, Pa	*Power*
C. F. Hirshfeld, Detroit, Mich	*Ordnance*
E. B. Katte, New York	*Railroads*
George H. Perkins, Boston, Mass	*Textiles*

The Organization Meeting was attended by President Miller, who considered that the new sections proposed were opportune and would keep the membership in close touch with the fields of their activity. The sections would probably be able to get very good material for papers, both as to timeliness and intrinsic value.

Each member present at the meeting participated in a round-table discussion on the possibilities of his particular section, following which the meeting elected Mr. E. B. Katte as permanent chairman of the Special Committee.

The meeting adopted a resolution defining the functions of the committee as follows:

> The functions of the Committee on Professional Sections are to form, foster and coördinate technical sections as the demand arises. The object of the professional sections is to promote the mechanical engineering of the arts to which they are devoted, either by the preparation of technical papers, discussions and debate, or by technical research.

This resolution was later referred to the Council and adopted by that body and in turn referred to the Committee on Constitution and By-Laws to be formulated into a By-Law specifying the duties of the Standing Committee on Professional Sections when created.

At the close of the meeting each member of the committee was instructed to prepare and mail a letter to all men who might be

interested outlining the plan to be followed in forming a section, and when sufficient interest was aroused in any Professional Section to call a meeting to draw up a petition for a section in accordance with the By-Laws of the Society.

Under this procedure Mr. E. B. Katte, representing Railroads on the Main Committee, called a conference of members of the Society interested to adopt a resolution to petition the Council to form a Railroad Section. Mr. Katte was made chairman of a Committee on Organization to draft the petition and to secure the necessary signatures. The petition was presented to the Council at its meeting on April 19 and was accepted and the section is now therefore in operation. The next step is to hold an election of officers, which will be done by letter ballot among all those members who have signed the petition. Sixty-five members signed the petition for this section.

A. S. M. E. Council Meeting

Budget of Finance Committee Approved—Functions of Committee on Professional Sections Defined—Policy on A.S.M.E. Student Branches Outlined

The regular monthly meeting of the Council was held in the rooms of the Society on Friday, March 19, at 10 o'clock. There were present: President, Fred J. Miller; Vice-Presidents, Fred R. Low, Henry B. Sargent, John R. Allen; Past-Presidents, Ira N. Hollis, D. S. Jacobus, Charles T. Main; Managers, D. Robert Yarnall, Charles L. Newcomb, Frank O. Wells, E. C. Fisher, Dexter S. Kimball, Earl F. Scott; Chairmen of Standing Committees: *Finance*, George M. Forrest; *Local Sections*, E. S. Carman; *Constitution and By-Laws*, represented also by Mr. Carman, and *Secretary*, Calvin W. Rice.

Finance Committee. The budget of the Finance Committee, reported by its Chairman, Mr. George M. Forrest, of appropriations for the last six months of the current fiscal year was approved, and the following table shows the total expenditures for the year now authorized.

APPROPRIATIONS FOR FISCAL YEAR ENDING SEPTEMBER 30, 1920

Office Administration			$48,000
Assessments, U. E. S., etc			24,400
Council and Contingencies			12,500
Cost of Journal Text	$70,000		
Cost of Journal Adv	58,000		
Total	$128,000		
Less Est. Adv. Receipts	97,000	$31,000	
Cost of Cond. Catalogues	35,500		
Less Adv. Receipts	50,000	—14,500	
Cost of Transactions		32,000	
Cost of Year Book		14,050	
Total		$62,550	
Less Net Income From Sales		10,250	
Net Cost of Publications			$52,300
Journal Development ($19,500 Loan from Reserve to Be Repaid)			
Local Sections			43,675
Membership			5,700
Meetings, General			16,200
House			2,275
Student Branches			850
Research			2,500
Standardization and Technical Committees			10,400
Miscellaneous			1,550
Unexpected Current Expenditures			5,000
Reserve			11,250
Total			$236,600

Expenditures in excess of income ($20,000) authorized by Council to be met from reserve.

Meetings and Program Committee. In accordance with the recommendation of the Committee on Committees, concurred in by the Committee on Meetings and Program, the former subcommittees of the Committee on Meetings and Program were discharged with the thanks of the Council, and with the hope that their work could be merged into that of the new Professional Sections now in process of organization.

Local Sections. A petition for a section at Providence, Rhode Island, was received and approved, and an affiliation of this section with the Providence Engineering Society was approved and encouraged.

The Chairman of the Committee on Local Sections suggested a place for Spring meetings of the Society and joint meetings of the Local Sections for 1920-21, which was referred to the Committee on Meetings and Program.

Professional Sections. The Committee on Professional Sections, through its Chairman, Mr. E. B. Katte, submitted the following definition of the functions of the Committee:

The functions of the Committee on Professional Sections are to form, foster and coördinate technical sections as the demand arises. The object of the professional sections is to promote the mechanical engineering of the arts to which they are devoted, either by the preparation of technical papers, discussion and debate, or by technical research.

The Committee on Constitution and By-Laws was asked to phrase this definition of the functions of the Committee into a suitable By-Law to be incorporated.

Boiler Code Committee. Cases No. 273, 274, 275, 276, 277, 280, 281, 282, which have been mailed to the Council, with corrections to Cases 277 and 280, were approved and ordered printed in MECHANICAL ENGINEERING.

The name of the Sub-Committee to Prepare Specifications for Steam Piping to be embodied in the Code was changed to Sub-Committee to Prepare Specifications for Steam Piping, Valves and Fittings to be embodied in the Code, the scope of the Committee to be correspondingly broadened.

A question of submitting the Boiler Code to the American Engineering Standards Committee for adoption was deferred at any rate until after the next revision of the Code.

Power Test Codes. G. E. Goodenough, C. F. Hirshfeld and R. J. S. Pigott were approved as members of the Main Committee; Gardner T. Voorhees on the Individual Committee on Refrigerating Machines and Plants; two additional members of the Individual Committee on Fuels, and J. J. Mullan on the Individual Committee on Condensers, Water Heating and Cooling Equipment.

Code of Ethics. The Special Committee on a Code of Ethics submitted a proposed code which was ordered distributed to the members of the Council for investigation and action at the April Meeting, after which the Code will be printed and distributed to the entire membership at the Spring Meeting.

Metric System. It was voted that the Society, as a Society, does not and has not taken any stand in favor of or against the Metric System and that notice to this effect be published in The Journal of the Society, MECHANICAL ENGINEERING, and be given such further publicity as may be approved by the President.

Relations with Colleges. The following standards for Student Branches were adopted:

SUGGESTED POLICY ON STUDENT BRANCHES OF THE A. S. M. E.

The general definition by the Carnegie Foundation of the qualifications under which a college would be eligible to association with the Foundation does not seem entirely satisfactory, in the decision of the Committee on Relations with Colleges, as a standard of the eligibility of the universities and colleges in the establishing of student branches in the A.S.M.E. There are certain principles that should prevail, although circumstances may warrant some exceptions. In general, the Committee on Relations with Colleges will be governed by the following:

1 The students applying for a branch must be members of a college requiring as a preparation for entrance four years at the high school, or its equivalent.

2 There must be in the faculty an adequate staff for teaching mechanical engineering. Where there is only one professor, the importance of mechanical engineering in the university or college seems too small to warrant establishing a Student Branch of the Society.

3 There should be at least one member of the engineering faculty who is a member of the A.S.M.E. Otherwise there is no connecting link between the Society and the college.

4 There should be a sufficient number of eligible students to form an active Student Branch of the Society. Heretofore fifteen has been about the minimum on which a Student Branch has been accepted.

5 An equipment in the nature of buildings and laboratories should be sufficient to make a respectable professional course in mechanical engineering possible. It is quite easy to understand that the use of surrounding industries may supplement the laboratories or even largely replace them.

6 The course of studies should cover all the subjects ordinarily required to enable a graduate to begin his career in engineering. He should be eligible as an assistant, and should be able to do a certain amount of independent work in the drafting room, and in the industries.

It is proper to suggest to any college or university the desirability of having a general engineering society, where the department of mechanical engineering is too small to warrant a student branch of the A.S.M.E.; at the same time, the Committtee would be disposed to define mechanical engineering in very general terms.

The Committee on Relations with Colleges recognizes the value of work done in many institutions that have low entrance requirements, and there is no desire to classify them as inferior to the more advanced engineering colleges. It is simply that their field is different. Where the course of studies is substantial and the teachers are men of well recognized standing, the Committee would feel disposed to relax on a rigid insistance in college entrance requirements.

New rules for Student Branches were also adopted and ordered incorporated in the Rules of the Society.

The petition for a Student Branch for Montana State College of Agriculture and Mechanic Arts was approved.

Education and Special Training below Grade of College Work. Dr. Hollis, Chairman of the Committee on Relations with Colleges, recommended that in accordance with the recommendation of the Committee on Aims and Organization this Society appoint a committee to investigate what the Society should do in the field of industrial education below the grade of college work, thereby supplementing the work of the Committee on Relations with Colleges, and the President was authorized to appoint a committee to study and report back to the Council.

Charles T. Main Award. It was voted that the income from the Charles T. Main Fund be used for a cash prize of $100, to be known as the Charles T. Main Award, and to be given to a member of the Society who wins Life Membership in any given year for the presentation of a superior paper.

Invitations. The invitation from the University of North Carolina to the Inauguration of Harry Woodburn Chase as President of the University on April 28 was accepted.

Adjournment was taken to meet in the Congress Hotel, Chicago, April 19, at 10 a. m. in connection with the joint meeting of the governing board of the Western Society of Engineers with the boards of the Founder Societies.

CALVIN W. RICE, *Secretary.*

Changes in Constitution, By-Laws and Rules

Providing for the Election of a Nominating Committee by the Voting Membership, Broadening the Scope of the Publication Committee and Prescribing the Duties of the Committee on Professional Sections

THE adoption by the Council of the reports of two important committees—the Committee on Aims and Organization, and the Committee on Committees—and the putting into effect of the recommendations embodied in them has developed the necessity for certain changes in the Constitution, By-Laws and Rules, which are being supervised by the Committee on Constitution and By-Laws so that when all activities are finally settled and working under the new arrangements the documents will be up to date.

The fundamental changes in procedure determined on so far are incorporated in Amendments to the Constitution which will come up for final action at the semi-annual business meeting of the Society to be held at the Spring Meeting in St. Louis on May 24th. These constitutional Amendments were published in MECHANICAL ENGINEERING, issue of November 1919 (Sec. 2, p. xvi). They have since been balloted on and the action at the Spring Meeting is to announce the result of the ballot.

The provisions of these Amendments are briefly as follows:

1 To create a Standing Committee on Professional Sections.

2 To extend the privilege of a seat on the Council to the Chairman of all the Standing Committees.

3 To provide for the adoption by the Society of reports, standards, formulæ or recommended practices.

4 To provide for the termination of membership on the Council or any committee on account of absence, either willful or due to force of circumstances. All these provisions were originally recommended by the Committee on Aims and Organization.

NEW MANNER OF ELECTING OFFICERS

Changes in the By-Laws to provide for the election of the Regular Nominating Committee by the voting membership have now all been worked out by the Committee on Constitution and By-Laws and have been adopted by the Council. These changes are of importance and are here published in full. They are based on a new schedule for the election of officers which was recommended by the Committee on Aims and Organization and which was referred to in the March issue of MECHANICAL ENGINEERING.

The regular Nominating Committee shall be composed of seven members nominated prior to the Annual Business Meeting by the delegates of the Local Sections, and elected by the Society at the Annual Meeting. Each Local Section delegate shall have been selected by election from the voting members of the Society being assigned to some Local Section by the Committee on Local Sections, exclusively for the purpose of selecting the Local Sections delegate. The members of the Regular Nominating Committee shall be elected for one year, and no member shall be eligible for more than two consecutive terms.

On or before October 1 of each year the Committee on Local Sections shall apportion among the Local Sections all of the voting members of the Society as of October 1, and shall notify the Executive Committees of the various Local Sections and the Secretary of the Society of these distributions.

Each Local Section shall, on or before the second Thursday in November, elect its Local Section delegate in any manner that it sees fit, and shall then immediately notify the Secretary of the Society of such election.

B-29 The Secretary shall publish the names of the Nominating Committee in the February issue of MECHANICAL ENGINEERING, together with a request to the voting membership of the Society that they recommend to the Committee the names of eligible persons for the elective offices to be filled at the next election.

B-30 The Nominating Committee shall deliver to the Secretary in writing between the first and fifteenth of May the names of its nominees for the various elective offices next falling vacant under the Constitution, together with the written consent of each nominee. The names of the nominees for the various offices proposed by this Committee shall be published by the Secretary under the names of the Committee in the June issue of MECHANICAL ENGINEERING.

B-31 A Special Nominating Committee, if organized, shall on or before the first Tuesday in August present to the Secretary the names of its nominees for the elective offices next falling vacant under the Constitution, together with the written consent of each nominee. The names of the nominees for the various offices proposed by this committee shall be published by this Committee in the September issue of MECHANICAL ENGINEERING.

The president shall, on or before the third Thursday in August of each year, appoint three Tellers of Election of Officers, whose duty shall be to canvass the votes cast and certify the same to the President or Presiding Officer at the first session of the Annual Meeting. Their term of office shall expire when their report of the canvass has been presented and accepted.

The voting for the election of officers shall close at 10 o'clock in the forenoon on the last Tuesday in September in each year. The tellers shall not receive any ballot after the stated time for the closure of the voting. The Tellers shall first open and destroy the outer envelopes and shall then open the inner ones, canvass the ballots and certify the result to the Secretary not later than the first day of October. The Secretary shall then announce the candidates having the greatest number of votes for their respective offices, and their names shall be published in the November issue of MECHANICAL ENGINEERING. The officers shall be declared elected by the Presiding Officer at the Annual Meeting in December and their terms of office begin on the adjournment of the Annual Meeting.

During the month of October the President-elect shall select from the membership of the Society members to fill all impending vacancies in the Standing Committee whose appointment shall be formally announced at the first Council Meeting following the Annual Meeting

Prior to, or during, the Annual Meeting the members of each Standing Committee whose terms do not expire at the termination of the Annual Meeting, and the newly selected members, shall organize and choose a chairman to serve for one year, whose name shall be announced at the first Council Meeting following the Annual Meeting, the organization to become effective on the adjournment of the Annual Meeting.

A member of a Standing Committee whose term of office has expired shall continue to serve until his successor shall have been appointed. The President shall appoint the Chairman of each Professional Committee.

President May Function for Treasurer

A slight change has been made in the By-Laws to enable the President to make payments for the Society, as well as the Treasurer, and both these officers will be placed under bond. The Amendment reads as follows:

The President or Treasurer may make payments, and shall make them only on the audit of the Finance Committee or upon the direction of the Council, by resolution of that body. They shall furnish a bond for the faithful performance of their duties to such amount as the Council may require, such bonds to be procured from an incorporated guarantee company, at the expense of the Society.

Scope of Publication Committee Broadened

The scope of the Publication and Papers Committee has been more clearly defined in an Amendment to the By-Laws describing the duties of this Committee. The new By-Law follows:

The Publication and Papers Committee shall consist of five Members, Associates or Associate-Members. The term of office of one member shall expire at the end of each Annual Meeting. The Committee shall have the supervision of all the publications of the Society.

In its conduct of Mechanical Engineering, the Journal of the Society, the Committee will be expected to publish such material as will be of value to engineers in the practice of their profession, and information upon society affairs, papers and discussions given at meetings, original contributions, reviews of engineering literature, and news items may be included.

The Committee shall also review all papers and discussions contributed to the Society to decide what papers and discussions or parts of these shall be printed in the Transactions.

At the end of each fiscal year, the Committee shall deliver to the Council a detailed report of its work.

By-Laws on Professional Sections

Now that the Professional Sections are being organized, the Committee on Constitution and By-Laws has under consideration a new By-Law to prescribe the duties of Committee on Professional Sections, which will administer this activity under the direction of the Council. By-Laws detailing the operation of these sections are already in effect, having been formulated some three years ago at the time the Local Sections By-Laws were drafted. The Council has adopted the following slight amendment regarding dues of affiliates of Professional Sections:

They (Affiliates) shall pay ten dollars ($10) per annum, which shall be due and payable in advance on October 1 of each year of their enrollment, and shall thereby be entitled to receive the regular issues of The Journal for a period covered by such subscription.

Slight Changes in Local Sections Rules

On recommendation of the Committee on Local Sections the Council has adopted an Amendment to the By-Laws covering Local Sections to change the term "Local Members" to "Affiliates." The following is the amendment:

Any other person interested in engineering may be invited by the Local Committee to join its Section as an *Affiliate*, but he shall not have the right to vote or hold office. Such Affiliate shall pay dues to the Section not to exceed $5 per annum, which shall be due and payable in advance on October 1 of each year of his enrollment. Affiliates shall not be considered in the allotment of expenses to the Section.

An Amendment to the same set of By-Laws, extending the privilege of attending meetings of the Committee on Local Sections to the chairmen of all executive committees of Local Sections has also been adopted.

Other Amendments Pending

There still remain amendments to the Rules governing Student Branches; these have been suggested by the Committee on Relations with Colleges and are now in the hands of the Committee on Constitution and By-Laws.

Also, a Special Committee chosen from the Local Sections is reporting to the Council on the Rules for Conducting Meetings of the Society, and their recommendations will be incorporated as soon as accepted.

The 1920 Year Book will contain a complete copy of the Constitution and By-Laws, corrected to the last Annual Meeting and with footnotes including all Amendments under consideration at the present time.

Calvin W. Rice,
Secretary.

Report of the Special Committee on Committees

Recommending the Classification of Committees, the Appointment of Committeemen for a Definite Term of Years, the Compiling of a List of Those Eligible for Service and the Discharging of Certain Committees Whose Work Is Otherwise Distributed

Important recommendations concerning the committees of the Society are made in the report of the Special Committee on Committees which was appointed by the Council in December to make a general investigation of the committee work and which presented its report to the Council at its January meeting, when it was received and adopted and ordered published in Mechanical Engineering. The report follows:

To the Council of the A.S.M.E.:

Gentlemen:

Your Committee on Committees appointed at the December Council Meeting beg to submit the following report:

The Committee has held three meetings: December 4, December 29 and December 30.

The Committee makes the following recommendations:

Classification of Committees

For the purpose of classifying Committees in the published lists of the Society and without changing the Constitution and By-Laws of the Society, the Committee recommends that all Committees be listed under Administrative Committees, Professional Committees and Non-Professional Committees, and that in each of these classes there be two divisions, Standing Committees and Special Committees.

Administrative Committees are those devoted to the conduct of the business affairs of the Society.

Professional Committees are those concerned with the professional activities of the Society and to the divisions of Mechanical Engineering with which the Society is concerned.

The Non-Professional Committees are those interested in subjects of a non-professional nature which are not administrative.

Standing Committees are Committees appointed for a continuous existence to act on specific subjects referred to them and upon all matters relating to these subjects as they occur.

Special Committees are those appointed for specific work and for a specific term of service.

The Committees of the Society known at present to the Committee on Committees will be listed as follows:

Administrative Committees

Finance	Standing Committee
Meetings and Program	" "
Publication and Papers	" "
Membership	" "
Constitution and By-Laws	" "
Local Sections	" "
House	" "
Library	" "
Relations with Colleges	" "
Awards and Prizes	" "
Regular Nominating Committee	Special Committee
Special Nominating Committees	" "
Tellers of Election	" "

Committee on Committees........................Special Committee
Rules for Conducting Meetings....................Special Committee

Professional Committees

Air Machinery..................................Special Committee
Boiler Code....................................Standing Committee
  Sub-Committees of Boiler Code................Special Committees
    Executive Committee
    Sub-Committee on Air Tanks and Pressure Valves
    Sub-Committee on Boilers of Locomotives
    Sub-Committee on Rules of Inspection
    Sub-Committee on Welding
    Sub-Committee on Miniature Boilers.
Foundry Practice...............................Special Committee
Gas Power......................................Special Committee
Industrial Buildings...........................Special Committee
Machine Shop Practice..........................Special Committee
Power Test Code................................Standing Committee
  Divisional Committees of Power Test Code.....Special Committees
Professional Sections..........................Standing Committee
Railroads......................................Special Committee
Rehabilitation of the Blind....................Special Committee
Research.......................................Standing Committee
  Special Committees of Research................Special Committees
Standardization................................Standing Committee
Textiles.......................................Special Committee

Committee on Standardization:

  Feedwater Heaters............................Special Committee
  Protection of Industrial Workers.............Special Committee
  Small Tools and Machine Tool Elements........Special Committee
  Shafting.....................................Special Committee
  Steel Roller Chains..........................Special Committee
  Screw Threads and Threaded Parts.............Standing Committee
    Flanges and Pipe Fittings..................Special Committee
    Tolerance in Screw Thread Fits.............Special Committee
  Technical Nomenclature.......................Standing Committee
  Weights and Measures.........................Standing Committee
Code of Ethics.................................Special Committee

Non-Professional Committees

S. T. Wellman Memorial.........................Special Committee
Carnegie Resolutions...........................Special Committee
War Participation and Members' Memorial.......Special Committee

Society Representatives and Other Members of Joint Activities

American Association for the Advancement of Science
American Engineering Standards Committee
Bureau of Mines, Advisory Committee
Bureau of Mines, Sub-Committee on Equipment
Bureau of Mines, Sub-Committee on Fuels
Conference Committee to Determine Cost of Electric Power
Conference Committee on Boiler Code Specifications for Materials
Conference Committee on Heating Section of Boiler Code.
Engineering Council
Engineering Foundation
Engineering Education
Gage Committee
John Fritz Medal
Joseph A. Holmes Memorial
National Research Council
Naval Consulting Board of the United States
Trustees United Engineering Society
Washington Award of the Western Society of Engineers

Appointment, Tenure of Office and Chairmanship

The Committee recommends that the appointment to membership on any Standing Committee be set for a definite term of years, and in appointing a Committee, the term of office of each member shall be so specified by the President of the Society that not more than two-fifths of the members shall retire at the end of any year.

Special Committees which are appointed for a single or specific purpose requiring only a brief or temporary service should be discharged upon the acceptance of their report. When Special Committees require a year or more to complete their work, the members shall be appointed for a definite time, subject to reappointment on submitting a Progress Report requesting further time. They are to be discharged upon the acceptance of any final report.

In creating a Committee, the Council should determine whether or not the Committee is to be a Standing Committee or a Special Committee.

The President shall specify the terms of office of the several members of a Committee when the Committee is first appointed, and in appointing new members to succeed others whose terms of Committee membership have expired, the terms of such appointments shall be for the longest period of membership on such a Committee. In appointing a member to succeed another member who ceases to act on a Committee or who resigns, the appointment shall be for the unexpired term of the person whose place he has taken.

In appointing a new Committee the President shall designate the Chairman, but after the Committee has served for a year it may choose its Chairman subject to the approval of the President.

It is recommended that an effort be made to appoint two-fifths of the Committee membership from the younger men of the Society.

It is recommended that whenever a Committee member fails to participate in the Committee work, the President shall inquire the reason therefor, and, if advisable, call for the resignation of such a member.

Committee Members From One Local Section or Adjacent Section

In appointing Special Committees for definite work, it is recommended that when practicable the whole Committee be selected from one Local Section of the Society or from a group of Local Sections adjacent to each other.

Membership on Several Committees

It is recommended that the number of Committees on which one member of the Society may serve at any one time shall be limited to three, except for temporary service, where special qualifications should govern the selection.

List of Eligible Committeemen

In order to secure a list of men available for service on Committees it is suggested:

1 That a letter be prepared asking a member if he is willing to serve on Committees and to state on what subjects he is best qualified. This letter is to be sent out as an enclosure in some future communication.

2 That statements be published at intervals in MECHANICAL ENGINEERING covering this subject in proper form to secure attention.

3 That the Executive Committees of the Local Sections and the deans of engineering schools be requested to furnish names of available men qualified for Committee work.

Rotation in Membership

It is recommended that as far as possible the membership of a Committee be rotated so as to secure the services of more members and to permit a change in Committee procedure.

Visits of Chairmen

It is recommended that the Society pay the traveling expenses of the Chairmen of its Committees for the purpose of visiting members of the Committee or bodies interested in the work of the Committee when this traveling is done for the development of the Committee activities.

Representatives on Joint Activities Reported to Council

It is recommended that the senior representatives of the Society on each of the joint activities in which the Society is represented be requested to keep the Council informed of the activities of these bodies. Annual reports to the Council are to be required from these representatives.

In listing the Society's representatives on joint activities, it is recommended that the names of the representatives of other societies appear in the list when such list is not too large.

Traveling Expenses of Committees

The value of the Society to its members, to the profession and to the world depends on the work of its Committees to a great extent. The value of its publications is increased by the work of these Committees, and Committee work must be continued. The Society expenses of non-active members of the Society are merely the annual dues. The Society expenses of the active members of the Society are not only the dues but the traveling expenses and time given to the Society's work. In some cases the time is contributed by the employer, but in many cases the time is given by the member. The Council will call to mind many illustrations of this fact. It is difficult to secure members from a distance on certain active Committees on account of the traveling expenses necessary in such cases. For these reasons it is recommended that as funds become available one of the best uses to which they can be put is to pay the traveling expenses of the members of the Committees. As the income from the publications of the Society increases, it is the belief that in place of reducing the dues it would be well to continue these as at present and use any surplus for the traveling expenses of Committee members.

Committees

The Committee has investigated the activities of the Committees of the Society and makes the following recommendations regarding them:

It is recommended that the Standing Committee of Public Relations be discharged, its functions being cared for by Engineering Council.

It is recommended that the Committee on Machine Screw Nuts be reorganized as a Standing Committee with broader powers, to handle such matters as the standardization of nuts and the heads of rivets, bolts and screws.

It is recommended that the old Committee on Machine Tool Standardization be discharged and that a new Committee on Standardization of Small Tools and Machine Tool Elements be organized.

It is recommended that the Standardization Committee be requested to act as the Committee to advise the Council from time to time on the advisability of appointing new Committees on Standardization of Specific Matters, and to serve as the connecting link between the A.S.M.E. and the American Standardization Committee.

Respectfully submitted,
M. E. Cooley, *Chairman*,
F. R. Low,
D. S. Jacobus,
A. M. Greene, Jr.,
D. S. Kimball.

PERSONALS

In these columns are inserted items concerning members of the Society and their professional activities. Members are always interested in the doings of their fellow-members, and the Society welcomes notes from members and concerning members for insertion in this section. All communications of personal notes should be addressed to the Secretary.

CHANGES OF POSITION

Lyle B. Marcy, formerly superintendent of the Hart and Cooley Company, Inc., New Britain, Conn., has become connected with the Chase Companies, Inc., Waterbury, Conn., in the capacity of research engineer.

Ernest C. Van Winkle, formerly assistant engineer, construction department, Chile Exploration Company, New York, became associated with the Ford, Bacon and Davis Company, New York, in the capacity of valuation engineer.

Erwin A. Weiss has resigned as assistant manager of methods with the Isko Refrigerator Company, Chicago, Ill., to accept a position as service engineer with the Mitchell Motors Company, Racine, Wis.

Frank R. Duvic has severed his connection as overseer with the U. S. Engineering Office, New Orleans, La., and is now in the employ of the West India Sugar Finance Corporation, Cayo Mambi, Oriente, Cuba.

Harold D. Bliss has resigned as chief mechanical engineer for Morris and Company, of Chicago, Ill., and has become associated with B. P. Lientz, of the B. P. Lientz Oil Furnace Company, New York.

Clinton E. Haver has resigned his position with Willard Case and Company to accept the position of works engineer with The Hooven and Allison Company, Xenia, Ohio.

P. B. Wesson has left the Clinton Wright Wire Company, Palmer, Mass., where he was employed as mechanical superintendent for the past six years, and has acquired an interest in and has been made secretary of the Hampden Brass Company, Springfield, Mass.

John A. Lawrence, formerly assistant mechanical engineer, The New York Edison Company, New York, has assumed the position of engineering manager for Thomas E. Murray, Inc., New York.

John Sharp, until recently connected with the Ferguson Steel and Iron Company, has become connected with the hull drafting department of the Submarine Boat Corporation, Newark, N. J.

James U. Norris has resigned his position as assistant superintendent of the Presbyterian Hospital, New York, to become the superintendent of the Woman's Hospital in the State of New York, New York City.

ANNOUNCEMENTS

Charles H. Tavener, mechanical engineer, Garden City, L. I., has resigned from the Garden City plant of the Curtiss Aeroplane and Motor Corporation and announces that he has started the practice of consulting industrial, production and aeronautical engineering, with laboratory facilities for testing and development work in New York and Boston. During the war, Mr. Tavener did mathematical designing and production engineering with the Curtiss Engineering Corporation.

Joseph W. Berger, formerly inspecting engineer for the Construction Division of the War Department, has resigned his position and become connected with the New York office of the Locomotive Superheater Company.

John S. Black has received his discharge as Lieutenant-Colonel, Ordnance Department, U.S.A., and has assumed the duties of Assistant Machinery Sales Manager, New Britain Machinery Company, New Britain, Conn.

D. Robert Yarnall has left for Germany for a period of three months to assist in the distribution of food to the children and needy mothers of that country under the direction of Herbert Hoover's relief administration.

Colonel James B. Dillard, formerly chief of engineering division, Ordnance Department, has resigned his commission in the Army and is now a member of the executive staff of the Cleveland Twist Drill Company, Cleveland, Ohio.

Henry B. Lange has retired from the United States Shipping Board, Emergency Fleet Corporation, to become secretary of the Malleable Chain Manufacturers' Institute of Chicago, Ill.

Laurence W. Hayes has resigned as Cleveland sales manager for the Worthington Pump and Machinery Corporation and is now associated in business with F. N. Hayes and J. N. Hayes, in Boston.

H. W. Jarrett, formerly assistant fuel engineer, U. S. Bureau of Mines, Pittsburgh, Pa., has assumed the duties of sales engineer with the George J. Hagan Company, combustion engineers, Pittsburgh, Pa.

Harry Deverell has severed his connection with the Deverell, Spencer & Company, which he incorporated and in which he served as president and treasurer, and has opened offices in Baltimore as a sales engineer for machinery, especially elevating, conveying and power transmission machinery.

Lloyd C. Farquhar, formerly Captain, Ordnance Department, U. S. A., stationed at Cincinnati, Ohio, has accepted a position as assistant works manager with the American Steel Foundries, in their branch office at East St. Louis, Illinois.

NECROLOGY

COOLIDGE JOHNSON BENNETT

Coolidge J. Bennett, mechanical superintendent, Bigelow Hartford Carpet Co., Lowell, Mass., died on February 24, 1920, of pneumonia Mr. Bennett was born on June 9, 1885, in Lowell, Mass. He was educated in the schools of Milltown, N. B., Canada, where his father was mechanical superintendent of the St. Croix Cotton Mills. Later he returned to Lowell and started work for the Hamilton Manufacturing Co., where he received a seven-years' training as machinist.

From 1910 to 1915 he was associated with the following concerns: Slater & Sons' Woolen Mills, Farnumsville, Mass., as master mechanic; Armour & Co., Lowell, as engineer in charge; the Federal Shoe Co., Lowell, as master mechanic; Stone & Webster Co., Canton, Mass., as assistant chief engineer. In 1915 Mr. Bennett became connected with the Bigelow Hartford Carpet Co. as mechanical superintendent.

Mr. Bennett was a member of the National Association of Stationary Engineers and belonged to a number of fraternal organizations. He became an associate-member of the Society in 1919.

FREDERICK LINCOLN EMORY

Frederick L. Emory, professor of mechanics and applied mathematics in the University of West Virginia, died on December 31, 1919. Professor Emory was born in Lunenburg, Mass., on April 9, 1867. He received his common school education there and attended college at Worcester Polytechnic Institute, from which he received his bachelor's degree in mechanical engineering in 1887. For the next two years he was the director of the mechanical and manual training department of the Washington, D. C., high school. During 1890 and 1891 he established and superintended the Trades School in the Massachusetts Reformatory, Concord Junction, Mass.

In the fall of 1891 he was selected by the late Dr. Eli Marsh Turner, then president of the University of West Virginia, to establish and take charge of the new department of mechanical engineering. This he did most successfully, constructing the first mechanical hall on the site now occupied by the University heating plant. From 1892 to 1895 he was engaged in establishing and directing the Industrial Training and Technical High School for the city of Indianapolis, Ind. In the fall of 1895 he entered Cornell University to take postgraduate work and in 1896 received the degree of master of mechanical engineering. He then returned to the University of West Virginia to

become professor of mechanics and applied mathematics. In 1899, Worcester Polytechnic Institute, his alma mater, conferred upon him the degree of master of engineering.

Professor Emory became a member of our Society in 1894. He was also a member of the Society for the Promotion of Engineering Education.

JAMES DOUGLASS MUDGE

James D. Mudge, manager of Mudge-Hoffman & Co., Seattle, Wash., died on February 12, 1920. Mr. Mudge was born in Harpersville, N. Y., on August 9, 1879. He was educated in the Binghamton schools and Cornell University, from which he received his M.E. degree in 1904. He spent a short time with the Buffalo Forge Co. and then left in January, 1906, for the West where, for a time, he worked in the city engineer's office in Seattle, resigning to take charge of the office of the Halliday Machinery Co. in Spokane.

For the past ten years Mr. Mudge was engaged in engineering contracting work in his own interest with offices in Seattle and Vancouver. He designed and installed numerous plants for power generation, pumping, mining, crushing and milling as well as many special mechanical devices.

During the war Mr. Mudge rendered valuable assistance at the University of Washington by instructing in mechanical engineering. After many attempts he was accepted for active service late in 1918.

Mr. Mudge was a member of the Sons of the Revolution. He became an associate-member of the Society in 1919.

HAROLD PRESTON RIX

Harold P. Rix, vice-president and branch manager of the Los Angeles office of the Rix Compressed Air & Drill Co., died on February 11, 1920. Mr. Rix was born in San Francisco, Cal., on August 2, 1888, and was educated in the schools of Redwood City and Palo Alto, Cal. He served a four-year apprenticeship in the Asiatic squadron of the U. S. Navy and at the age of twenty was honorably discharged with the rating of coxswain. For about two years he was connected with the North Star Mines, Grass Valley, Cal., where he worked first as a machine-drill miner and later in the compressor room of the cyanide plant. He then became assistant to the master mechanic of the Nevada Petroleum Co., Coalinga, Cal.

In 1912 he became associated with the Rix Compressed Air & Drill Co., San Francisco, Cal., as salesman; later he was appointed branch manager of the Los Angeles office, where for several years he had charge of the installation of many compressed-air plants for industrial, mining and pumping purposes.

Mr. Rix belonged to several social clubs in Los Angeles. He became an associate of the Society in 1919.

Section Meetings

BALTIMORE:

April 2. Business Meeting.

April 16. Joint Meeting with Baltimore Section, A. I. E. E. Subject: The Super-Power System, by Mr. W. S. Murray, Consulting Engineer, New York City.

BIRMINGHAM:

April 23. Joint Meeting with Atlanta Section, in Birmingham. Dean John R. Allen was the speaker.

CHICAGO:

March 19. Subject: Beauties and Power Development of Niagara Falls, by William M. White.

April 15. Joint Meeting with other Engineering Societies in cooperation with Western Society of Engineers. Subject: Teaching Shop Executives, by Professor B. W. Benedict, of the University of Illinois.

April 19. A. S. M. E. Council Meeting held in afternoon, and Joint Meeting of the Four Founder Societies: A. I. M. E., A. I. E. E., A. S. M. E. and A. S. C. E., and Western Society of Engineers and the local members of other national societies. Banquet preceded by informal reception, and followed by brief addresses from the Presidents of the four Founder Societies.

April 20. Luncheon, at which were present, members of the Board of Directors of the five Societies, and the Executive Committees of the local sections.

CINCINNATI:

April 22. Subject: Theory and Practice, by Dean John R. Allen.

CLEVELAND:

March 23. Subject: Methods of Measuring Flow of Fluids, by E. G. Bailey, President Bailey Meter Co.

April 13. Subject: Is There a Cure for Class Differences in America? by Dr. Ira N. Hollis.

COLORADO:

February 27. Subject: Some Interesting Tests on a High Pressure Automotive Steam Boiler, by E. H. Nate.

April 23. Subject: The Engineer and the Public, by Durbin Van Law.

CONNECTICUT:

HARTFORD BRANCH:

April 12. Subjects: Drop Forgings and Die Castings, by representatives from the Billings and Spencer Co., the J. H. Williams Co., the Veeder Mfg. Co., and the Doehler Die Castings Co.

MERIDEN BRANCH:

April 8. Subject: Boiler Feeding, by Stanley Brown, Griscom-Russel Co., New York. A four-reel motion picture was shown on "The Twist Drill—Its Uses and Abuses."

NEW HAVEN BRANCH:

April 16. Subject: Progress in Mechanical Engineering Research, by Professor Arthur M. Greene, Jr., Chairman of the Research Committee, A. S. M. E.

EASTERN NEW YORK:

March 26. Subject: Gas Warfare in the A. E. F., by Major Frederick Pope.

April 23. Subject: Bearing Metals, by C. H. Bierbaum, Consulting Engineer.

ERIE:

April 12. Subject: Is There a Cure for Class Differences in America? by Dr. Ira N. Hollis.

INDIANAPOLIS:

April 22. Subject: The Manufacture, Properties and Uses of Malleable Castings, by H. A. Schwartz.

MILWAUKEE:

March 17. With Milwaukee Engineering Society. Subject: Falk Gears as Applied to Marine and General Uses, by Percy Day, Manager of the Gear Department of the Falk Co., Milwaukee, Wis.

NEW ORLEANS:

March 17. Business Meeting. Sub-Committee on Membership appointed.

April 17. Business Meeting was held. General discussion of Section Affairs.

NEW YORK:

April 13. Symposium on Welding. Papers were: Elements of Arc Welding, by O. A. Kenyon; Gas Welding, by A. S. Kinsey; and Thermit Welding, by J. H. Deppeler.

PHILADELPHIA:

April 27. Subject: Modern Practice in the Manufacture of Steel, by Col. W. P. Barbara, Philadelphia, Pa.

ST. LOUIS:

April 7. Joint meeting of the Associated Engineering Societies of St. Louis. Subject: Different Processes in the Manufacture of a Heine Boiler, by F. O. Pahlmeyer, Engineer, Heine Safety Boiler Co.

April 30. Subject: Development in Chain Grate Stoker, by H. P. Gauss, Engineer Illinois Stoker Co.

SAN FRANCISCO:

April 1. Meeting of Executive Committee. Subject: Informal talk on Commercial Development of the Aeroplane, by Dr. Durand.

April 8. Subject: Development of the Diesel Engine, by Mr. Tachella. This talk was illustrated by lantern slides.

April 10. Visit to the Municipal Installment of the Diesel Plant of Palo Alto.

WASHINGTON, D. C.:

March 31. Subject: Some Commercial Heat Treatments for Alloy Steels, by A. H. Miller, Bureau of Research, Midvale Steel and Ordnance Co., Philadelphia, Pa. Some Recent Developments in Alloy Steels, by H. J. French, Bureau of Standards; The Application of Alloy Steel to Engineering Work, by P. E. McKenney, Chemist and Metallurgist, Washington Navy Yard.

WASHINGTON STATE:

March 1. Subject: The Relation of the Engineer in Successful Industrial Management, by Stephen I. Miller, College of Business Administration, University of Washington, Seattle, Washington.

April 19. Subject: An Investigation of Compressed Spruce Pulleys, by Prof. G. S. Wilson, Chairman Research Committee.

ONTARIO:

April 8 or 9. Subject: Milling Machine Construction and Design, by an Engineer from Brown & Sharpe.

ROCHESTER:

April 14. Subject: Is There a Cure for Class Differences in America? by Dr. Ira N. Hollis.

TOLEDO:

April 9. Organization Meeting; election of new officers. Subject: America's Future in the World Wide Industry, by Mr. E. S. Carman.

ENGINEERING SOCIETY OF AKRON:

April 15. Meeting held in new rooms. Subject: Manufacture of Wrought-Iron Pipe, by Craig Seddis of the Reading Iron Co.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

EXPERIENCED LOCOMOTIVE DESIGNERS, DETAILERS, AND TRACERS wanted by firm of locomotive builders. Detailers and tracers without locomotive experience will be considered. Location Pennsylvania. R-2280.

ELECTRICAL FOREMAN for construction department of power company; must be capable of taking entire charge under supervision of electrical superintendent of crew of 5 or 6 men, in connection with rebuilding of 18,000 kw. central-station bus structure and switch board. Technical graduate preferred. Application should contain detail information of technical training, past experience, age, nationality, attitude towards question of organized labor and whether or not applicant is user of intoxicating liquors. Location Ohio. R-2425.

SALES ENGINEERS to open up outside territory for sale of automobile tires after two or three months' training in vicinity of New York City. Some selling experience essential. Man between 30 and 40 years of age desired. R-2459.

MARINE DRAFTSMEN. Location Port Newark, N. J. R-2486.

MECHANICAL DRAFTSMAN for position with Copper-mining company; $200 to $230 per month, including special payment due to high price of copper. Apply in writing, stating full details regarding experience, and give references. Location Arizona. Z-497.

SEVERAL DRAFTSMEN, all grades, familiar with merchant and naval-marine installations. College men with other experience considered. Location Pennsylvania. Z-322.

EXPERIENCED DRAFTSMAN, thoroughly familiar in raw-sugar and refinery work, wanted at once for position in New York. Give full particulars. Z-416.

GENERAL FOREMAN OR OPERATION SUPERVISOR for machine-tool works, manufacturing lathes, screw machines, universal grinders, etc. Must be good mechanic with ingenuity, long experience, and good judgment. Must be competent in trying out highest possible speed of each operation, and in determining highest speed of production that can be maintained safely. Will have charge of setup, speed setting and progress inspection. Location Massachusetts. Z-417.

MECHANICAL ENGINEERING GRADUATES, Class of 1920, as student engineers in training course of large company. Excellent opportunity for experience in theoretical mechanical engineering. Location Massachusetts. Z-611.

ASSISTANT HIGHWAY ENGINEER, should be able to run out alignment, cross section and figure earth quantities and layout highway bridges. Expenses will be paid from assigned headquarters. Also transportation from New York to Santo Domingo. Must stay at least six months or passage fare will be deducted from salary. Salary to start the day of leaving New York. Z-731.

MECHANICAL ENGINEER to take charge of mechanical-engineering department of foreign subsidiary of American Oil Corporation. Applicant should have at least three years' experience in oil field, with a total of five to ten years' actual practical experience in laying out pipe work, boiler and pumping plants, etc. State experience, references, age, salary expected and whether married or single. Z-792.

RATE SETTER WANTED—New Jersey manufacturer of machine tools wants first-class man thoroughly experienced in setting rates on large and small machine tools or work of similar nature. In addition to necessary trade knowledge, applicant must be possessed of initiative and tact. Please give full particulars as to character of training and experience, age, salary wanted, etc. Z-793.

PRODUCTION MECHANICS of products of metal-turning machines such as automatic screw, Bardon & Oliver lathes, Warner & Swasey lathes, Porter & Cable lathes, etc., at sustained 80 per cent efficiency with an accuracy in all dimensions of .0005 in. Must be between 35 and 45; have served apprenticeship at tool making and worked several years at trade; and then have successful record of at least 5 years' actual responsibility handling men and machines with some commercial producing concern. Must also be above average in tactfulness and ability to handle men. Salary $65-$75 to start; in proportion to results accomplished thereafter. Location vicinity of Philadelphia, Pa. Z-806.

SALESMAN to handle refrigerating machinery. Must have good general engineering knowledge but need know nothing of refrigeration. Salary depending upon qualifications. Location Philadelphia, Pa. Z-808.

ENGINEER to set rates in connection with piece-work on factory maintenance work. Position requires practical knowledge of construction work including carpentry, bricklaying, labor work, painting, steel work, and sheet-metal work. Location Connecticut. Z-811.

ENGINEERS AND DRAFTSMEN trained in various branches of mechanical and structural drafting to work on design and manufacture of Holbeck preparing and distributing pulverized coal system. Company wishes to choose men from among applicants who have had excellent training and reasonable amount of general experience. Location Ohio. Z-824.

TIME-STUDY MAN for making studies on machine and bench operations, the operators being both male and female. Salary to start from $35 to $38 per week with opportunity for advancement. Location New Jersey. Z-825.

PRODUCTION ENGINEER, for company manufacturing furniture. Woodworking experience desirable. Man under 35 years will not be considered. Location Ohio. Z-828.

FOUNDRY SUPERINTENDENT for company manufacturing malleable-iron fittings. Location Detroit, Mich. Z-831.

RESEARCH ENGINEER, 24-27 years old, to understudy engineer now in charge of planning department of wood-working establishment. Mechanical engineering graduate preferred, also one who understands principles of management. Apply by letter. Location New York City. Z-832.

DRAFTSMEN. We are in need of number of first-class draftsmen for laying out detail work on conveying machinery. We want men who can produce and who are looking for good-paying positions as draftsmen. If you are in this class, write us outlining your experience, as this is well worth your consideration. Z-835.

CHIEF DRAFTSMAN OR ASSISTANT ENGINEER to have charge of drafting room for general work of industrial-chemical plant. Location Pennsylvania. Z-841.

FOUNDRY SUPERINTENDENT for foreign service. Must be willing to go to South America and stay there permanently. Z-842.

ASSISTANT MANAGER to look after upkeep of plant and business administration of large research laboratory. Man 28 to 32 years of age, with good engineering and industrial experience desired. Knowledge of economics useful. Must be able to write good letter, and have presence and personality. Location New York City. Z-849.

POWER-PLANT LAYOUT ENGINEER; must be thoroughly experienced in this line of work. (B) GENERAL DRAFTSMAN for manufacturing plant work; man with paper-mill experience desired. Location Canada, 100 miles from Montreal. Z-850 A-B.

SALESMAN for sales-promotion work and supervision of battery service stations in New York, New Jersey and Connecticut. Technical graduate from school in vicinity of New York City preferred, but other will be considered. Good future. Salary $100 per month and traveling expenses. Headquarters in New York City. Z-851.

CHIEF DRAFTSMAN with experience in construction work, architectural lines, and mechanical drafting. Will have staff of draftsmen under him in each of these three lines. Should be an executive so that he can plan work ahead and be able to keep up work for three departments and check the different drawings. He will report directly to the Chief Engineer. Location New York State. Z-862.

ENGINEERS, preferably graduates in mechanical or civil engineering with from one to five years' experience in construction of roofing-material mills, wallboard mills, or paper mills; capable of going to plant and making survey, sketching desired information; able to complete designs and specifications for additional improvements; capable of interviewing and getting line on local contractors, so that work may be let out to them; able to act in capacity of instructor in construction. Ideal man would be drafting engineer. Location New York State. Z-863.

INDUSTRIAL-POWER SALESMEN AND INDUSTRIAL-HEATING ENGINEER; capable of assuming direct charge of district in city of St. Louis, conducting all negotiations incident to sale of power in large blocks to new industries and conversion to central-station energy of any isolated plants, now in existence. Able to handle such negotiations with minimum of supervision; should be graduate electrical engineers. Those having sales experience in industrial-power work preferred. Location Missouri. New York interview possible. Z-864.

ENGINEER; must have general mechanical maintenance experience, drafting ability, and all-round engineering knowledge enabling him to eventually act as assistant chief engineer. Preferably an adaptable man of about 28-30 years who is worth $150 per month and upwards; salary to be determined. Location New York State. Z-865.

FOREMAN for testing department for magnetos and magneto generators. Department has 25-30 men. Location Brooklyn, N. Y. Z-871.

DESIGNING ENGINEER familiar with coal breakers, tipples, etc. May qualify later for field work as superintendent. Good future. Location New York City. Z-874.

INSTRUCTOR IN MECHANICAL LABORATORY; young college graduate in mechanical engineering, with one or two years of commercial experience preferably in experimental work. Man about 25 really desirous to get into teaching game desired. If right kind of personality and push there is excellent opportunity for advancement, to very responsible position. Salary $2000 per year of ten months. Location Brooklyn, New York. Z-880.

CHIEF INSPECTOR; high grade man of engineering qualifications and experience who will

assume charge of all inspection at the three plants of company manufacturing typewriters. Will also have charge of metallurgical department. Location New York State. Z-884.

MECHANICAL ENGINEER with forceful personality and thorough practical and theoretical knowledge covering steam power, mechanical drives, steel and concrete construction to take charge of design and construction of large, new paper-mill proposition. Paper-mill experience not necessary. Will work under engineer 1000 miles away, and in all paper technical matters will follow paper expert direction. In first letter give full information. Salary about $5000. Z-885.

YOUNG MECHANICAL ENGINEER, of about 4 years' experience along general lines of manufacturing production. Must be of good personality and of quick intelligence to meet clients and assist them, in working out various phases of manufacturing problems. Salary would be $150 a month and expenses while away from main office. Headquarters New York City. Z-886.

CHIEF INSPECTOR; graduate engineer with several years of practical experience in machine-shop, foundry and forge work. Man with time-study experience so that he can assume charge of setting of standards preferred. Main job will consist of reorganizing inspection department, and putting it on proper basis. Z-887.

YOUNG ENGINEER with experience in installing production systems, to help on similar work. In addition to bicycles and sewing machines, several new lines of product will be introduced, possibly along electrical lines. Location Ohio. Z-888.

COST ACCOUNTANT for manufacturing concern making sewing machines, bicycles and forgings. Location Ohio. Z-889.

SALES REPRESENTATIVE preferably with technical training, although this is not absolutely essential; between ages of 28 and 38; company can put out in territory with full knowledge that he is working for company's interests alone, devoting entire energy towards pushing of sale of machine tools. Should have knowledge of machinery to be prepared to assist prospective customer in adjustment of old machines of company's manufacture that he might have in his plant and in order to talk intelligently to his prospective customer. Z-895.

RATE SETTER for lathe, planer and milling-machine work. Location Connecticut. Z-900.

LUBRICATION ENGINEER for the Philippines; must be able to speak Spanish fluently and must be experienced as there is not time for instruction. Salary $3000 and traveling expenses. Location Philippines. Z-901.

RADIO DRAFTSMAN with at least two years' experience. Some experience in radio desirable. Location New York City. Z-915.

DEVELOPMENT WORK of tungsten products pertaining to manufacturing of filament for incandescent lamps. Recent graduate or undergraduate could qualify. Location Bloomfield, N. J. Z-919.

MECHANICAL ENGINEER to act as trouble finder for lithographic company and able to repair troubles when found. Location New York City. Z-922.

MECHANICAL ENGINEER to erect and operate food-products plant, similar to glucose-manufacturing plant. Location east of Chicago. Z-923.

CHIEF INSPECTOR with ability to properly read mechanical blue prints, to be thoroughly familiar with all types of machinery ordinarily found in manufacturing plant and must also have executive ability. Company manufactures wide range of equipment including hand-cutting and welding apparatus and much machine apparatus for same purpose, but electrically driven. These necessitate great accuracy and precision in assembly. Location Jersey City, N. J. Z-927.

SALES ENGINEER with commercial experience. Must have commercial rather than engineering viewpoint. Young man ambitious, enthusiastic, steady and stable, unquestionably loyal, a good letter writer, having good conception of what is needed to write advertisements for engineering products. Location New York City. Z-932.

LARGE MANUFACTURING COMPANY has opening for man experienced in design of special machinery used in manufacture of sheet-metal work. Requires man of tact to coöperate to fullest extent with plant superintendents and with various other departments. Location Pennsylvania. Z-943.

MECHANICAL ENGINEER, young, 23 to 33, as assistant to factory superintendent of company manufacturing cash registers, small recorders, etc. Must be graduate engineer, have native executive ability and possess caliber for advancement to managing position. Machine-shop and tooling experience required. (B) ASSISTANT WORKS MANAGER for company manufacturing cash registers, small recorders, etc. Must be able executive and have practical experience in all departments including production and tooling. Good opportunity. Location Chicago. Z-947-A-B.

SUPERINTENDENT for large laundry plant in New York State. Must know technical end of laundering in addition to laundry machinery. Must have at least 3 years' experience in similar position. Best of references required. Location New York State. Z-949.

TEACHER for mechanical and machine drawing department qualified to do chief work required of teacher in that department, mechanical drawing and design; would be required to take charge of four advanced classes and do approximately 26 periods of teaching per week; necessary for him to have had some teaching experience, some drafting-room experience, the right educational preparation, preferably an engineering school or normal art school diploma. Location Massachusetts. Z-951.

ASSISTANT EDITOR; engineer familiar with gas engines and if possible some garage or automobile work. College graduate with one or two years' experience preferred. Services not required until first or middle part of June. Excellent opportunity for advancement. Z-953.

ELECTRICAL DRAFTSMAN to act as designer and squad leader. Must be experienced in layout and design of generating stations and substations. Location New York City. Opportunity for advancement. Appointment must be made by letter stating salary expected and experience. Location New York City. Z-955.

SENIOR PROFESSOR OF MECHANICAL DRAWING (B) SENIOR PROFESSOR OF MECHANICS, desirable that he have practical and commercial experience. (C) ASSISTANT PROFESSOR IN ELECTRICAL ENGINEERING. Location South. Z-956.

THREE ENGINEERS, preferably with technical education and at least five years' experience in design high-pressure hydraulic and gas machinery and high-pressure piping. Experience in practical machine-shop design desirable. Salary is two to three thousand dollars. Location Washington, D. C. Z-957.

DRAFTSMAN experienced in laying out of conveying machinery and relocation of machinery, boilers, etc. Location West Virginia. Z-958.

PRODUCTION SUPERINTENDENT experienced in cabinet making to systemize and reorganize present plant manufacturing phonograph cabinets. Location Youngstown, Ohio. Z-960.

INSTRUCTORS, 1,000 men for army vocational schools. Mechanical and other subjects such as auto-repair, moving-picture operation, machine-shop practice, bookkeeping, etc. Civil Service entrance examinations. Location Army camps and posts. Z-961.

YOUNG MECHANICAL ENGINEER for production work. Must be technical graduate and be familiar with shop processes. Location New York City. Z-962-A.

ADVERTISING ENGINEER for agency. Must have proven sales ability and be producer of high-grade technical copy along mechanical lines. Commission basis at start with partnership to right man in the near future. Location New York City. Z-963.

RECENT GRADUATE, chemical engineer, for exporting work. Location New York City and then Japan. Z-964.

SUPERINTENDENT experienced in veneer manufacturing or woodworking. Must also understand modern methods of manufacture and management. Good future. Location Virginia. Z-969.

YOUNG ENGINEER to go to Columbia for surveying. Recent graduate. Must know how to run transit. One year contract. Location South America. Z-973.

MECHANICAL ENGINEER experienced in burning of especially the Mexican type of fuel oils. Should be able to design oil burner for use in connection with cast-iron sectional house-heating boilers. Only experienced men need apply. Z-978.

CHIEF MECHANICAL AND CONSTRUCTION ENGINEER for position at mines in Mexico being operated by large American Company. Must be graduate of high-grade technical school and be well equipped through training and experience for maintaining existing equipment and designing and installing new equipment and improvements in mines and concentrating and cyanide mills and have good knowledge of shop practice. Must be energetic and able to coöperate with associates. Good opportunity for properly equipped man. Knowledge of Spanish desirable though not necessary. Z-982.

ASSISTANT TO CHIEF DESIGNER. Must be graduate chemical or mechanical engineer with 2 years' practical experience. Air conditioning and drying-oven experience desirable. Location Providence, R. I. Z-1008.

INSTRUCTOR to teach elementary mathematics and mechanical drawing in apprenticeship school. Candidates should have some technical training and shop experience and should understand handling of young men. Offers excellent opportunities for advancement in works through one of its many departments. Location Connecticut. Z-1012.

MECHANICAL ENGINEER to take charge of machinery for treatment of asbestos fibre. Must be thoroughly proficient mechanical engineer, with good knowledge of electrical power. Must also be good executive. Location New York City. Z-1015.

CONSULTING ENGINEER experienced in production of chilled car wheels. Foundry experience on chilled wheels essential. Z-984.

MECHANICAL ENGINEER with experience in manufacturing of coiled springs. Location Chicago, Ill. Z-1004.

TOOL DESIGNER on small tools; also number of tracers. Location Hoboken, New Jersey. Z-1016.

DRAFTSMAN and office engineer for mining company. Z-1017.

RAILROAD ACCOUNTANT, to assist in large railroad investigation; must have experience in railroad engineering operations as well as in accounts. State age, nationality, salary expected. Z-1018.

DESIGNING AND OPERATING ENGINEER for industrial gas plants. Must possess executive ability and be capable of heading department. Reply in detail. Location New Jersey. Z-1019.

LARGE MANUFACTURING COMPANY in Indiana, employing about 7,000 employees, are looking for man to take charge of internal house organ, having circulation among their employees. This man must have had some similar previous experience including editorial writing. This is forty-page monthly. Will have an associated staff of about 20 other people in various parts of organization to help him and 2 or 3 people directly under him in his department. Would like some one who has been associated with manufacturing company so he would understand atmosphere of

such a plant. Salary in the neighborhood of $2,500 to $3,000 per year to start. Permanent position with excellent opportunity for advancement. Z-1020.

MECHANICAL ENGINEER, with at least 10 years' experience in design and construction of steam-power plants; must have thorough knowledge of thermodynamical calculations entering into steam-plant design and preferably some experience in operation of steam-power plants. Work will be along special lines of heat and efficiency calculations. Location Philadelphia. Z-1022.

CONSTRUCTING ENGINEER, experienced in drying machinery for sugar, coffee, grain, flour, etc., preferred. Permanent position for right man. Z-1022.

DESIGNING ENGINEER. If you are equipped to take hold of an established line of pressure-reducing valves and push them to perfection, you have an opportunity before you. Answer clearly and fully on following points: (1) Have you basic knowledge of designing and actual experience? Absolutely essential. (2) Can you design special valves such as relief, globe, check—reducing valves for high pressures? Any experience? (3) As designer and production engineer, could you take active charge of mechanical end and maintain maximum production? Any experience? (4) Give age, experience full, references and salary expected. Strictly confidential. Will not write references without your consent. The business is established, located in the Middle West. A good-paying proposition with bright future. Write immediately. Z-1023.

EDITOR with engineering education and experience sufficient to enable him to prepare the definition section of book, in which terms used in connection with material-handling apparatus, accessories, and methods are defined. He should also have had experience in writing technical articles, although if otherwise capable we will not insist on this qualification. Z-1024.

ENGINEERING SALESMEN, young, unmarried, with military service, to travel in different sections of United States selling electric refrigerating machinery to hotels, architects, butchers, florists, clubs, households, etc. Remuneration: salary and commissions on closed territory, plus all necessary expenses. Opening for about twenty men and there is ample opportunity for them to grow. Z-1025.

GRADUATE ENGINEER wanted, in September, to teach mechanics and assist in testing laboratory; teaching experience preferred but not essential. Box 483, State College, Penn. Z-1026.

INDUSTRIAL ENGINEERS, large firm of industrial engineers is constantly on lookout for qualified high-grade men. Technical education desirable but not essential. Must have successful executive manufacturing record and must be experienced in factory organization, management, production control, incentives, manufacturing methods and processes, stores control, employment and personnel work and have some knowledge of cost accounting. Should have practical knowledge of operation of machine tools, metal or woodworking or both. Men who have had experience as general managers, works managers, factory managers, superintendents, production managers, etc., are type desired. Applicants would be located in different localities for several months at a time. Salary commensurate with worth. Z-1027.

INSTRUCTOR in mechanical engineering; to teach mechanical drawing, descriptive geometry, kinematics and thermodynamics. Teaching experience desired but not necessary. Man with two or three years' practical experience preferred. State all qualifications in first letter. Location District of Columbia. Z-1028.

MACHINE DESIGNER of high-grade experience, with originality and initiative, qualified to design and superintend construction of special machinery for large industrial plant. Location Southern Ohio. Z-1029.

MAN to install and conduct Laboratory for concern in central Ohio making electrical motors. Work to cover chemical and physical as well as electrical and possibly microphotographic tests on material. Applicants must be familiar with this line of work and should be experienced in general inspection of all classes of raw purchased material. Some knowledge of foundry practice is desirable as the Laboratory will control the cupola mix for grey-iron foundry. Z-1030.

MECHANICAL AND CIVIL DRAFTSMEN wanted. Graduate engineers with experience in steel mills or similar plants preferred. Should be capable of carrying out plant designs and details completely. Location Eastern Pennsylvania. Z-1031.

MECHANICAL DRAFTSMEN wanted by concern located in Middle West, experienced in internal-combustion engines, also general layout and design. Applicants should state in detail, experience, education, reference and salary expected. Z-1032.

MECHANICAL ENGINEER familiar with design, construction and operation of power plant to supervise reconstruction work. Technical man with above experience preferred. Position with chemical manufacturing company. Z-1033.

MECHANICAL ENGINEER to take charge of drawing room. Manufacture, coke drawing and loading machines and heavy punches, shears, bending rolls and plate planers, etc. Z-1034.

MECHANICAL ENGINEER to teach kinematics, machine design, power plants and engineering problems. Location Pennsylvania. Z-1035.

NEW ENGLAND firm manufacturing machine tools, desires services of several rate setters and estimators possessing tact and initiative. Apply by letter stating experience in detail and salary expected. Z-1036.

UNIVERSITY in the Middle West desires man next September to take charge of foundry, conduct classes in advanced metallurgy, particularly as applied to the foundry, and develop work in metallography. Salary and rank will depend upon qualifications of successful applicant. Technical school graduate preferred. Excellent opportunity offered for development of subject of metallography as related to manufacturing operations of casting, heat treatment and the cold working of metals. Z-1037.

ENGINEER to handle correspondence courses in electrical meters and in steam-electric power stations. Practical operating experience essential; teaching experience not required. Part time work in New York City. Z-1038.

DRAFTSMAN, experienced in laying out pipe work and insulation work, etc., for refrigerating machinery. Knowledge of isometric drawing required. Location New York City. Z-1039.

TECHNICAL GRADUATE, experience and thorough knowledge of refrigeration essential. To make sketches in field and supervise laying out of job to suit sketches, also general office engineering work. Good opportunity with progressive concern. Location New York City. Z-1040.

PRESS-ROOM AND TOOL-ROOM FOREMAN. Shop making medium and small stampings in both light and heavy-gauge steel. Increasing shop capacity and offer good opportunity for two first-class men. Location Middle West. Z-1041.

LARGE MOTOR-CAR COMPANY contemplating considerable plant extensions desires to get in touch with men of ability, initiative, loyalty and good personality for operation of this additional plant. Mechanical-engineering graduates preferred, with manufacturing experience. At present these men will be expected to enter our organization and take up certain phases of problems preliminary to erection of new buildings. Age 30 to 50 years. Salary $4,000 to $10,000. Only complete replies considered. Location Syracuse, New York. Z-1042.

RECENT MECHANICAL ENGINEERING GRADUATES for student salesman and engineering courses of large pump and allied machinery manufacturers. Location New Jersey. Z-1043.

MECHANICAL DRAFTSMEN, familiar with power presses used in automobile sheet-metal work, also with hoisting equipment such as winches and cranes, and their application to trucks and small carriages. Steady employment. Good salary. Location Michigan. Z-1044.

MECHANICAL ENGINEER; must have experience in designing and selling hoisting and elevating electric and hydraulic machinery and apparatus, as well as in general jobbing work of large foundry and machine shop. Man under forty with technical education preferred. Give full details as to past and present employment, education, salary wanted, age, married or single and date services available. Answers treated confidentially. Z-1045.

COST MAN; must have considerable experience in manufacture of jewelry and silverware, their component of modern factory cost accounting. Will have charge of cost department under executive supervision and will take care of buying of factory supplies and parts. Apply in writing giving complete business history with dates, names and references, family, education and religion. Location Rhode Island. Z-1048.

DRAFTSMAN, heavy machine-tool industry with large volume of business on special designed machines, has openings in engineering department for designers, draftsman and detail men. Exceptionally good opportunity for men who can qualify for these positions. In reply give experience and present employer. Applications strictly confidential. Address Employment Department, the Niles Tool Works Company, Hamilton, Ohio. Z-1049.

SALES ENGINEER, to take charge of New York office. Must know New York territory and be familiar with combustion engineering. (B) Also sales engineer with similar experience of Ohio territory. Company, manufacturers of stokers. Z-1050-A-B.

ASSISTANT PROFESSOR OF MECHANICAL ENGINEERING to teach machine design, power-plant design and thermodynamics. Must have had practical experience in engineering design and teaching experience in these subjects. Location New York City. Z-1051.

INSTRUCTOR IN MECHANICAL ENGINEERING to teach thermodynamics, mechanical drawing and descriptive geometry. Must have experience along mechanical-engineering lines and one year's teaching experience. Location New York City. Z-1052.

INSTRUCTOR IN MECHANICAL ENGINEERING to teach descriptive geometry, mechanical and master drawing and perhaps mechanism. Practical and teaching experience desirable and will be considered in fixing salary but are not essential. Location New York City. Z-1053.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month preceding date of issue and should be limited to 45 words. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

CONSTRUCTION ENGINEER; technical graduate; age 40; married. Experienced in plant design and all classes of construction. Specialist on crushing plants and metallurgical reduction works; have been in responsible charge of the design, purchase of equipment, and construction of this class of work for 10 years. Salary $7,200. Available June 1. References. SM-5211.

ASSISTANT EXECUTIVE, for adding machine or typewriter factory. Age 26, technical graduate with inventive mind. All-around shop man; 3 years' designing and experimenting on new adding machine now ready for marketing. Successfully handled production and

labor problems. Has initiative to handle big things if given the authority. SM-5212.

MECHANICAL ENGINEER; at present professor mechanical engineering; available June 1 to Sept. 15, permanent position would be considered. Experienced in maintenance engineering, power-plant operation and design, machine and internal-combustion engine design; exceptional ability as test engineer. Age 30. Salary dependent on location. SM-5213.

ASSISTANT TO WORKS MANAGER, production or industrial engineer; American; 15 years' shop and office experience. Have had charge of tool design and planning department at large plant during war; put work through from start to finish. Wish to locate with live concern where initiative is required and advancement possible. Salary $3,700 to $4,000. SM-5214.

CHIEF DRAFTSMAN; at present employed; technical education; ten years' experience, design of tools, jigs, fixtures, mechanical research, development of labor-saving devices, inventive ability; experience as assistant production manager, traveling interviewing manufacturers; would prefer position as assistant to manager or superintendent. Salary $3,000-$3,500. Position should be in immediate vicinity of Boston. SM-5215.

CHIEF DRAFTSMAN, young man with ability and initiative, seven years' varied experience including responsible charge upon design of jigs, fixtures, dies and gage; small brass articles, instruments and light automatic machinery. Possess sound mechanical ideas on factory arrangements. Desires change where opportunity will lead to greater authority. Location preferably Greater New York or vicinity. SM-5216.

CHIEF DRAFTSMAN OR ASSISTANT ENGINEER. Technical graduate in mechanical and civil engineering. Age 31, married. Eight years' experience as detailer, layout, checker, chief draftsman and mechanical engineer, Power plants and units, electric locomotives, electric traveling cranes, airplane equipment and instruments of precision. Not production or industrial expert but high-grade mechanical engineer qualified to supervise designing and drafting departments. SM-5217.

CHIEF ENGINEER, 37, desires similar or executive position with tractor company. Eleven years' experience in design and construction of heavy-duty internal-combustion engines, transmissions and tractors. Minimum salary $6,000. SM-5218.

DESIGNER AND MECHANICAL ENGINEER; age 30, college graduate, broad experience on machine and tool designing, processing of interchangeable machinery and setting of manufacturing limits. Ten years' experience; last four in executive capacity as chief draftsman and chief gage designer. SM-5219.

DESIGNING OR MANAGING ENGINEER; technical graduate, 16 years' shop and drafting experience on quantity production of interchangeable parts; designer of special automatic machinery, labor-saving devices, intricate fixtures and dies for increased production; familiar with machine tools, metal stampings, steel wire, tin plate, wood and paper-working machinery. Ability and initiative to organize, qualified to take charge of designing force, superintend production or develop new proposition along modern lines. Salary $3,600 per year. Location Brooklyn, New York, preferred. SM-5220.

EDUCATIONAL DIRECTOR, associate member with five years' practical shop experience; two years' college study, seven years' experience in training apprentices, college students, men and women, for industrial work. SM-5221.

EFFICIENCY, COMBUSTION OR STEAM ENGINEER, Cornell graduate, age 29; three years' research experience with steam turbines and centrifugal machinery, three and one-half years in testing, combustion problems and steam engineering. Desires position with growing concern and wishes to locate in Eastern Pennsylvania. SM-5222.

EMPLOYMENT DIRECTOR OR INDUSTRIAL SALES MANAGER; capable of installing and maintaining various features of personnel work. Can organize shop-committee systems, profit-sharing plans, foremen's training work, incentives for production; as well as handle other personnel problems. Now director of employment and service department but desires to get into larger field. Best references from leading engineers in Society. SM-5223.

ENGINEER of twenty-five years' experience, technical graduate (M.E., Sc.D.), who has been teaching during past ten years, desires to return to commercial field. Broad experience along lines of power-plant and machine design. Ability to take responsible charge of high-grade work. SM-5224.

ENGINEER, technically trained, by experience and aptitude capable of developing mechanical apparatus, go out on floor and study routing, processing and devise improved means for increasing production. Married. Age 33, 14 years' machine-shop and designing experience. Can handle engineering department. SM-5225.

ENGINEERING TEACHER, M.E., M.S., Ph.D., Assoc, Mem. A.S.M.E., having specialized in applied mathematics, mechanics and thermodynamics, 33 years of age, at present assistant professor in thermodynamics, desires position as associate professor of mechanics; salary minimum $3,000. SM-5226.

EXECUTIVE ENGINEER; mechanical engineer with 10 years' experience in industrial and machine manufacturing, would like executive position with live concern as head of manufacturing or production. Have held positions of foreman, superintendent, production manager, and industrial engineer. Familiar with modern industrial engineering methods. Employed but desire change offering larger opportunities. Travelling position will not be considered. SM-5227.

GENERAL MANAGER, consulting mechanical engineer with broad business and manufacturing experience wishes to devote entire time to bringing some concern which has been mismanaged up to first-class paying condition or to coördinating and expanding various properties controlled by same interests. SM-5228.

GRADUATE ENGINEER, in charge of work in Homer oil field since the beginning; four years in South America. Speaks Spanish. Will go anywhere. Address Box 620, Homer, Louisiana. SM-5229.

GRADUATE MECHANICAL ENGINEER, age 25; single; junior member. At present salesman with large manufacturing company. Desires position with progressive concern offering good future in production or executive lines. Salary to suit responsibilities. Middle Western or Western location preferred. SM-5230.

INDUSTRIAL ENGINEER; graduate mechanical engineer, associate member, age 38, married. Six years' experience in installation and operation of systems of handling production, bonus systems and related work, time study, setting standards, investigations, research, and complete supervision of efficiency and production departments. Practical expert in machine-tool, sheet-steel and allied lines of manufacture. Immediately available. Salary minimum $3,800. SM-5231.

INDUSTRIAL OR SALES REPRESENTATIVE for England, France, Switzerland and Italy. Graduate engineer, age 26, leaving for these countries first week in June. Experience in oil-refining operation and design, also in automotive industries. Desires to represent these or kindred industries. SM-5232.

MANUFACTURING EXECUTIVE, trained along plant management lines. Technically educated. Twenty years' experience in successful administration of foundry pattern, machine and drop-forge shops manufacturing interchangeable parts in quantities. Broad minded, diplomatic in securing coöperation in all departments. Seeks connection with company that requires experience and hard work to get results. SM-5233.

MARINE ENGINEER, now manager well-known boiler appliance firm, wishes position eliminating travelling. Holds chief's unlimited ocean license (second issue), served two years Emergency Fleet, chief inspector machinery, etc. Member A.S.M.E. and S.N.A.M.E., Associate Society Naval Engineers. American; 34 years old; present salary $5,000 and bonus. SM-5234.

MARINE ENGINEER, specializing in Diesel engines, desires executive position with steamship company using oil engines, or oil-engine manufacturer interested in marine field. Age 35, married. Mechanical and electrical graduate from leading university; 13 years' experience in marine engineering, past seven years devoted to oil engines, covering design, installation, tests and sales. Employed by large manufacturer but wishes opening with better opportunity for exercise of initiative. SM-5235.

MECHANICAL AND ELECTRICAL ENGINEER; technical graduate; thoroughly experienced in steam power-plant and distribution system, design and construction. Desires permanent position and one of responsibility; public utility or engineering firm preferred. Age 28, married; minimum salary $3,300. SM-5236.

MECHANICAL AND LEGAL TRAINING, experienced in design, experiment and manufacture, desires position in business where legal training is desirable supplement to technical training. Familiar with patent and other law relating to engineering. Young. Future important. Salary $2,600. SM-5237.

MECHANICAL ENGINEER, age 37, married, master mechanical degree Cornell, 1905. 1½ years as inspector of installation and charge of testing producer-gas engine equipment; 2½ years instructor in steam engineering, 4 years in charge of power plant for large steel company, 7 years in present position in charge of power department of industrial company having 15 plants. SM-5238.

MECHANICAL ENGINEER; American, technical graduate; age 31; married. Nine years' experience in steel mills making tests and reports on present installations and new equipment as well as designing and operating boiler, power and producer plants; heating furnaces and steam, power, water and gas distribution systems. Experience in combustion work with various fuels. Desires position with manufacturing firm or consulting engineer. Location preferred, Ohio, Pennsylvania or New Jersey. SM-5239.

MECHANICAL ENGINEER, at present with large pulp and paper company, wishes to make a change. Four years' experience in general plant engineering, maintenance and construction; heating and ventilating. Special experimental work on internal-combustion engines, etc. Technical graduate in mechanical engineering. SM-5240.

MECHANICAL ENGINEER, graduate of M.I.T., age 26, married, extensive experience in power-plant design and operation, steam distribution and metering, and plant maintenance. Executive, with ability to produce. Experience in mills and industrial plants. Wishes to locate in East with progressive company. Minimum salary considered $250 month. SM-5241.

MECHANICAL ENGINEER, M.I.T. graduate, age 28, single, now employed. Two years' textile mill engineering and plant supervision, two years' administrative duties as Army ordnance officer, one year refrigeration work, desires man-size connection as assistant to business or manufacturing executive, or real opening with consulting-sales organization. Location minor consideration. SM-5242.

MECHANICAL ENGINEER, technical education, 31 years old. Experienced in testing, operation, development and design. Assoc. Mem. A.S.M.E. and A.I.E.E. Knowledge of organization and management. For last two years and at present employed by large electrical manufacturing concern. Desires position leading to executive responsibilities. Location New York. Salary $4,000. SM-5243.

MECHANICAL ENGINEER; technical graduate with seven years experience in power-station construction and operation, thoroughly familiar with all combustion problems. Desires position with future, with strong engi-

neering company. Salary $3,600 per year. SM-5244.

MECHANICAL ENGINEER; technical graduate; 20 years' broad experience, as estimating engineer, chief engineer, master mechanic, superintendent of plant and sales engineer, in design, construction and operation of light, heavy and automatic machinery, design, construction, operation, and maintenance of industrial and power plants complete, and sale of power-plant apparatus and mechanical equipment. Present employed in executive engineering position. SM-5245.

MECHANICAL ENGINEER, technical graduate. Experienced in erecting and testing centrifugal pumps, condensers, etc. Now selling above line. Young man but considered expert on condensing and pumping equipment. Desires position New York or vicinity in sales, purchasing or engineering with domestic or export company needing engineer with above qualifications. Minimum salary $3,300. SM-5246.

MECHANICAL ENGINEER, 25 years' experience in design, manufacture and processing of highest class work, open for engagement. Experienced in handling men. Student of factory organization and management. At present holding position of chief mechanical engineer. Will consider similar or any good executive position, or consulting engineer. Salary according to responsibilities. SM-5247.

MECHANICAL ENGINEER; technical graduate, 17 years' experience in design, installation, remodeling and operation of steam-power plants and oil-pipe line work. Wide experience in use of crude oil as boiler fuel. Prefer location in West, Southwest or Orient. SM-5248.

MECHANICAL ENGINEER, leaving for Sweden early in July, will undertake any mission of an engineering nature in Scandinavian countries. SM-5249.

MECHANICAL ENGINEER AND EXECUTIVE; age 31, technical education and training; five years' production engineering experience, two years' research engineering; capable of taking processes in experimental stages and putting them on production basis, desires position as plant engineer, preferably in New York or Boston or vicinity. SM-5250.

MECHANICAL ENGINEER, plant engineer in charge of design and manufacture of machine tools, special machinery, jigs, dies and tools, design, repair and maintenance of buildings, grounds, machinery, electrical equipment, power plant, machine-shop tool room and plant layout. SM-5251.

MECHANICAL OR PLANT ENGINEER; age 31, technical education; 15 years' practical experience, including pattern, foundry and machine shops, reorganization, construction, equipment, operation and maintenance industrial and power plants. Valuation work, planning and estimating. Employed and married. Location immaterial. Salary $4,000. SM-5252.

MECHANICAL ENGINEER OR TECHNICAL SUPERINTENDENT, American, age 27, technical graduate, present location assistant engineer for large steel and wire company, desires connection with progressive firm requiring wide-awake young engineer. Congenial and good personality. Five years' experience with power-plant and heat-treating furnaces, including design, testing and operation. Minimum salary $3,000 to start. SM-5253.

MECHANICAL OR WORKS ENGINEER OR CHIEF ENGINEER, age 35, technical education; 15 years' experience, designing, manufacturing, plant maintenance and selling to metal-manufacturing industries. Present position works manager and chief engineer for large automobile company. Location immaterial. SM-5254.

MECHANICAL ENGINEER with special training would like to secure position with consulting engineer, or assistant to mechanical engineer in industrial steam-power plant. Technical graduate, 1915. Age 27, married. Prefer central or western New York State. Salary desired, $2,400. SM-5255.

MECHANICAL ENGINEER would like to represent machinery manufacturers, in Cuba. Have had many years' experience in sugar-machinery line, design, erecting, operating and selling and have a wide acquaintance through the island and Mexico. Am graduate engineer at present engaged. Answer to Sr. Ingeniero del 37—Prado 3, Havana, Cuba. SM-5256.

MECHANICAL-ENGINEERING STUDENT desires position in manufacturing plant where familiarity with machine tools and methods can be acquired. In return for this training and remuneration to cover expenses, the applicant offers his service in whatever capacity a four-year college training has qualified him. Location no consideration. Available June 1. SM-5257.

MECHANICAL ENGINEER OR SUPERINTENDENT OF CONSTRUCTION, power or works. American, 38 years old. Fifteen years' first-class experience with satisfactory references. SM-5258.

MECHANICAL ENGINEER with manufacturing and purchasing experience. Cornell man, married, junior member, age 26; one year in shops, year as draftsman, year as assistant superintendent; four and half years' purchasing and shipping machinery and manufacturing supplies for export, now employed, wants position with good future. SM-5259.

OIL-REFINERY ENGINEER acting as assistant to general manager of a 20,000-bbl. refinery with experience in design, construction and operation of all equipment used. Assoc. Mem. A.S.M.E., Graduate electrical engineer. Age 31, married. Desires similar position with organization affording opportunity for advancement upon proving desirable personal qualities and ability to handle large affairs. SM-5260.

PLANT ENGINEER and mechanical superintendent; technically educated; has had more than ten years' experience in engineering and maintenance of industrial plants and been with power companies and consulting engineers. Permanent connection near New York City desired. SM-5261.

POWER-PLANT SPECIALIST; ten years' experience in power-plant construction and operation. Technical graduate. Age 32. Married. Wishes to secure position in power-plant design work or similar lines. Salary $250-$300. Location preferred, Chicago. SM-5262.

WANTED, an opportunity to prove a valuable assistant to busy executive or plant manager. Graduate mechanical engineer possessing tact, initiative, executive ability and broad engineering and business training is immediately available. SM-5263.

SALES MANAGER ENGINEER; 15 years' management sales mining and milling machinery, machine tools, contractors' equipment, power, paper and industrial-plant equipment, air-lift pumping, steam, electric and oil-power apparatus, and every kind of machinery used in metal-mining country and in the usual industries. Has unusually broad experience covering every side of sales-engineering. Now located San Francisco. Familiar with entire territory west of Rocky Mountains. Will consider acting as manufacturers' agent. SM-5264.

STEAM ENGINEER, non-professional, age 43; 22 years' experience; 16 years in charge of steam plants up to 6,000 hp. First-class Massachusetts license; at present employed. New England or New York State location preferred, but will consider others. SM-5265.

WORKS OR PRODUCTION ENGINEER; age 34; Cornell M.E.; practical machinist before going to college; seven years' diversified experience in tool design, inspection, design and improvement of special machinery with view of reducing cost of manufacture, establishing proper manufacturing tolerance on interchangeable work, increasing production through selecting proper tools,, feeds and speeds; standardization. References furnished. Salary $3,000. SM-5266.

WORKS SUPERINTENDENT; industrial engineer, experienced in machine-shop and allied trades on high-grade interchangeable semi-production work. Age 45, good record, stable, now employed, desires change. Broad experience in handling skilled labor; shop processes, materials, equipment and tools, organization, production control. SM-5267.

YOUNG ENGINEER, age 26, technical graduate in M.E.; three and a half years' experience in power-plant layout and plant efficiency, desirous of entering broader field. Single and willing to go anywhere. SM-5268.

SUPERINTENDENT OF CONSTRUCTION, PLANT ENGINEER OR MANUFACTURING EXECUTIVE. Fifteen years' experience. At present in charge of all construction and maintenance for large manufacturing corporation. Used to large responsibilities along these and similar lines, also shipyard management and vessel construction. SM-5269.

MECHANICAL ENGINEER, technical graduate; age 28; desires to locate with concern in New York or vicinity in position with future. Ex-service man with rank of Major. Experienced in handling an organization employing 500 men with machine shop, store house, etc. At present employed. SM-5270.

MECHANICAL-MARINE ENGINEER; executive ability; age 38; university and M.I.T. graduate; experience as engineer and manager in power-plant, industrial and marine work. Permanent connection desired with manufacturing or commercial organization. SM-5271.

ASSISTANT ENGINEER, technical graduate in mechanical engineering, age 26, single, with three years' experience in latest motor design. Also experienced in design and manufacture of special automatic machinery, jigs, fixtures, plant layouts, and special appliances for automobile motor-test rooms. Desires position as assistant engineer in automotive industry. Preferred location, Middle West. Available on 30 days' notice. SM-5272.

GRADUATE MECHANICAL ENGINEER, 27; single; having several years' varied heavy-machine-design construction and installation experience, desires opportunity to develop machine-shop practice and apply training. SM-5273.

MECHANICAL ENGINEER recently released from war duties with twelve years' experience as executive in design and manufacture of high-grade machinery such as is used in large power plants, would like to make connection with some first-class concern. Applicant is accustomed to modern scientific management, and can handle whole or any section of modern plant management, including office control, engineering, planning, factory control, production, inspection; is available at once; would accept moderate salary to make connection with good concern. Have had wide lecturing experience and would also consider connection with first-class university. SM-5274.

ENGINEERING EXECUTIVE OR WORKS MANAGER; member A.S.M.E., having fifteen years' experience as executive with leading mechanical machinery and equipment concerns, including five years as works manager; now in military service, but expecting to be free June 1; desires position where can secure share in business; prefers new enterprise or to re-organize old establishment on modern basis. Eastern location preferred. SM-5275.

MECHANICAL ENGINEER (member), now assistant to general superintendent of large manufacturing plant, seeks new connection with progressive organization. Energetic, resourceful, practical, capable executive and systematizer with 18 years' varied experience; design (10 years directing others), engineering, production and various other functions of factory operation, chiefly in manufacture of general machinery, steam-power apparatus and allied lines. Age, 36. SM-5276.

MECHANICAL ENGINEER; technical graduate, married. Six years' experience in special machinery, locomotive and industrial-plant design, desires position with progressive company. Now employed by largest machinery house in West. Salary $2,700. SM-5277.

WORKS MANAGER OR SUPERINTENDENT, sixteen years' experience; shop work, designing engineer; inspection and production engineer, engineer in charge of machinery installation, assistant works manager. Graduate mechanical engineer. Age 37 years. SM-5278.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER MAY 18, 1920

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 216.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by May 18, 1920, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

California

FRANKLIN, JOSEPH K., Mechanical Engineer, The Foundation Co., El Segudbo
HEMINGWAY, RANSOME L., Chief Boiler Inspector, Industrial Accident Commission, State of California, San Francisco
McNUTT, JOHN F., Superintendent of Construcstruction, U. S. Ind. Service, Los Angeles
PORTEOUS, EDWARD J., Technical Director, Celite Products Co., Lampoc
SIBBETT, GEORGE E., Mechanical Engineer, Columbia Steel Co., San Francisco
STEBBINS, HORATIO W., Assistant Professor, Leland Stanford Jr. University, Palo Alto

Colorado

BARNES, HAROLD B., Consulting Engineer, Denver

Connecticut

BAK, ANDERS K., Laboratory Assistant, Sheffield Scientific School, New Haven
BRAUN, JOHN L., Mechanical Draftsman, The Yale & Towne Manufacturing Co., Stamford
CHAPLIN, JOHN H., Works Manager, C. J. Root Co., Bristol
CLARKE, WILLIAM W., Plant Engineering, Bridgeport Brass Co., Bridgeport
EICKHOFF, AXEL, Designer, Babcock Printing Press Manufacturing Co., New London
FOWLER, ARTHUR U., Supervisor, Stanley Rule & Level Co., New Britain
HITCHCOCK, JAMES E., Assistant to Scheduling Supervisor, Winchester Repeating Arms Co., New Haven
LUTHER, HARRIS G., Draftsman & Designer, Lockwood, Greene & Co., Hartford
McQUEENEY, JAMES T., Scheduler, Winchester Repeating Arms Co., New Haven
SNIFFEN, WILLIAM H., Industrial Foreman, Bridgeport Hardware Manufacturing Corp., Bridgeport
SOMERS, BRUCE K., Pratt & Whitney Co., Hartford
WALL, WILLIAM C., Foreman of Plumbing & Steam Fitting, Stanley Works, New Britain

Delaware

WILLIAMS, CHARLES H., General Superintendent, Pennsylvania Seaboard Steel Corp., New Castle

District of Columbia

BEHAR, MANOEL FELIX, 1st Lieutenant, Member of Technical Staff of the Chief of Ordnance, U. S. Army, Washington
DUGAN, JOHN A., Instructor, Mechanical Engineering Department, Catholic University of America, Washington
TICER, WILMER L., Mechanical Engineer, Supervising Architect Office, Treasury Department, Washington
WITMER, GEORGE S., Mechanical Engineer, Machinery & Engineering Branch, Office Director of Purchase, Q. M. C., U. S. A., Washington

Illinois

AINSWORTH, H., President, Williams, White & Co., Moline
BENNETT, WILLIAM H. K., Manager Pump Department, American Manganese Steel Co., Chicago
CAMPBELL, ROBERT H., 2nd Vice President & Production Manager, Comet Automobile Co., Decatur
JOHNSTON, ARTHUR C., Vice President, Link Belt Co., Chicago
MANTONYA, WILLIAM G., Assistant Chief Engineer, Shafer Bearing Corp., Chicago
PORTH, HARRY W. L., Master Car Builder, Swift & Co., Chicago
ROSE, HAROLD B., Chief of Drafting & Inspection, Avery Co., Peoria
SMITH, HAROLD C., President, Illinois Tool Works, Chicago

Indiana

McNEELY, HARRY B., Routing Engineer, Link-Belt Co., Indianapolis
SWIGERT, WILLIAM K., Vice President & General Factory Manager, The Oakes Co., Indianapolis
WHEELER, VERNON C., Master Mechanic, Citizens Gas Co. of Indianapolis, Indianapolis

Kansas

STRONG, ROBERT G., Superintendent, Machine & Gas Engine Department, Empire Gas & Fuel Co., Oil Hill

Louisiana

COLOMB, CLIFFORD, Fuel Oil Engineer, Dixie Mill Supply Co., New Orleans
DAVIDSON, WILLIAM H., Manager, Machinery Department, Southern Jobbers' Supply Co., New Orleans
KURSHEEDT, EDWIN M., Half Owner, Mid-Continent Engineering Co., Shreveport

Maryland

LEHR, WILLIAM E., Manager, The Mergenthaler Co., Baltimore

Massachusetts

BROWN, GREGORY, Assistant Chief Engineer, Norton Grinding Co., Worcester
CHENEY, ROBERT B., Assistant, Massachusetts Institute of Technology, Cambridge
COLEMAN, THOMAS C., Jr., Tool Draughtsman, American Bosch Magneto Corp., Springfield
DAVIS, GEORGE H., Assistant, Production Department, Morgan Construction Co., Worcester
DULLIGAN, CHARLES E., Assistant Superintendent, Commercial Division, U. S. Cartridge Co., Lowell
ENO, ARTHUR A., District Engineer, Petroleum Heat & Power Co., Boston
EVERETT, ARTHUR C., Charge of Tool Design Engineering Department, Pneumatic Scale Corp., Limited, Roxbury
FAY, CHESTER H., Rolling Mill Designer, Morgan Construction Co., Worcester
FORD, ARTHUR R., Computer, General Electric Co., Lynn
FULLER, GEORGE F., President, Wyman, Gordon Co., Worcester
GANG, OLIVER F., Sales Engineer, Lunkenheimer Co., Boston
GILLIARD, CHARLES T., Inspector of Naval Construction, Boston Navy Yard, Boston
HENDRICKSON, FRED K., Chief Engineer & Designer, Reed-Prentice Co., Worcester
HEWITT, WILLIAM B., Mechanical Engineer, Worthington Pump & Machinery Corp., Holyoke
LAMB, HAROLD, Production Manager, The Lamson Co., Lowell
LEVINE, LEONARD I., Designer, General Electric Co., W. Lynn
RENTON, WILLIAM R., Industrial Engineer, Chapman Manufacturing Co., Winchester
ROBERTS, CLAUDE B., President, C. B. Roberts Engineering Co., Boston
SNOW, ALEXANDER I., Plants Engineer, Graton & Knight Manufacturing Co., Worcester
STRANGMAN, WARREN A., Engineer & Inspector, Underwriters' Bureau of New England, Boston
SUNDBERG, GILBERT C., Designing Engineer, Wyman-Gordon Co., Worcester
TRUE, WALTER A., Assistant Mechanical Engineer, Reed & Prince Manufacturing Co., Worcester
VAN DUSEN, CHARLES T., Graduate Student, Massachusetts Institute of Technology, Boston
WALKER, WILLIAM L., Management Engineer, Worcester
WHITE, WALDO E., Designing Draftsman, Revere Sugar Refinery, Charlestown

Michigan

ALLISON, FRED, Electrical Engineer & Superintendent of Power, Ford Motor Co., Detroit
BOLTON, FREDERICK R., Designer of Conveying Machinery, Hudson Motor Co., Detroit
EDWARDS ARTHUR P., Mechanical Department Engineer, Goodyear Tire & Rubber Co., Detroit
FURUSAWA, TAKESHI, Designing Engineer of Motor Trucks, General Motors Truck Co., Pontiac
JONES, MALVERN S., Tool Engineer, American Blower Co., Detroit
MARQUARDT, WILLIAM H., Superintendent, Continental Motor Corp., Muskegon
MARSDEN, WARREN S., Draftsman, Morgan & Wright, Detroit
Schlieder, HOWARD A., Cost Estimator, Detroit Pressed Steel Co., Detroit

Minnesota

FRANCIS, PAUL E., Testing Engineer, Armour & Co., South St. Paul
HILDRED, JAHN W., President & Treasurer, John W. Hildred Co., St. Paul

Missouri

WERNER, ELMER L., Plant Analyst, Goodyear Tire & Rubber Co., Kansas City

New Hampshire

GETCHELL, EDWARD L., Assistant Professor, New Hampshire College, Durham

New Jersey

ANGELILLO, OLINDA R., Plant Engineer, Murray Motor Car Co., Newark
BEYER, BERTRAND E., Press Department Manager, Elevator Supply Co., Hoboken
CONNOLLY, FRANK G., Chief Inspector, Electro Dynamic Co., Bayonne
FORD, CHESTER M., Master Mechanic, American Coffee Products Corp., Elizabeth
HEWES, OLIVER P., Assistant Power Supervisor, E. I. du Pont de Nemours & Co., Arlington
KING, DOUGLAS H., Designer, Gould & Eberhardt, Irvington
IRISH, WILLIAM W., Factory Engineer, T. A. Edison, Inc., Bloomfield
KIPPER, FREDERICK C., Chief Draftsman & Engineer, E. A. Briner, E. Orange
McALLISTER, DAVID L., Cadet Engineer, Public Service Electric Co., Newark
MALAHAN, JAMES T., Superintendent of Valve Plants, Eastwood Wire Co., Belleville
RACK, EDGAR E., Assistant Manager, Precision Instrument Co., Newark
VOYSEY, ALFRED, Production Engineer, De-Laval Steam Turbine Co., Trenton
WELCH, ALBERT E., Power Engineer, Hercules Powder Co., Parlin (Re-Election)

New York

ALBERS, EDWIN N., Calculator, Engineering Department, American Locomotive Co., Schenectady
ALLEN, ARTHUR E., District Manager, Westinghouse Electric & Manufacturing Co., New York
BOILEAU, ARTHUR H., Erection Engineer, Kerr Turbine Co., Wellsville
BOLLER, FRANK J., Manager, New York Insulation Department, The Cutler-Hammer Manufacturing Co., New York
BRYMAN, HARRY, Mechanical Draftsman, Lord Construction Co., New York
CHENEY, JAMES B., President & Treasurer, Cheney & Co., Inc., New York
CONNOLLY, EDWARD A., Mechanical Draftsman, Sperry Gyroscope Co., Brooklyn
CUNNINGHAM, ROBERT O., Engineer, Ford, Bacon & Davis, New York
DAUTUN, ALPHONSE P., Draftsman, Julius Kayser & Co., Brooklyn
DELORENZI, OTTO, Testing Engineer, Combustion Engineering Corp., New York (Re-Election)
DEPP, PETER M., Sales & Field Engineer, Oliver Continuous Filter Co., New York
DEVINE, JAMES J., Instructor, Mechanical Engineering, Rensselaer Polytechnic Institute, Troy
DIX, HENRY N., Jr., Sales Engineer, American Radiator Co., New York
DONNELLY, RUSSELL, Sales Engineer, Hyatt Roller Bearing Co., New York
EBERLE, FRED H., Power Plant Designer, Atlantic Gulf Oil Refining Corp., New York

FIIGON, Earl H., Draftsman, Locomotive Superheater Co., New York
FOWLER, Elihu W., Mechanical Engineer, James W. Cox, Jr., New York
GAY, Walter C., Draftsman, DeLaVergne Machine Co., New York
GOODMAN, Lester L., Sales Engineer, Beech Nut Packing Co., Brooklyn
HANSEN, Herman C., Tool Inspector, Presto Machine Works, Brooklyn
HOWARD, Thornton W., Assistant Chief Turbine Inspector, General Electric Co., Schenectady
JORGENSEN, Olav E., Consulting Engineer, Worthington Pump & Machinery Corp., New York
KOENITZ, Arthur C., Machine Designer, Research Department, Western Electric Co., New York
KUEMMERLEIN, Edward M., Chief Draftsman, Kerr Tubine Co., Wellsville
LAFETRA, Clinton W., Chief Draftsman, Federal Adding Machine Corp., New York
LOUGHRAN, John J., Assistant Chief Draftsman, Doehler Die Casting Co., Brooklyn
LUNDQVIST, Arvid, Designer, Ford Instrument Co., New York
McNALLY, Keenan J., Assistant Engineer, American Sugar Refining Co., Division of Plant Appraisal, New York
MITCHELL, Louis J., Mechanical Draughtsman, Interborough Rapid Transit Co., New York
NAYLOR, James W., Assistant Plant Engineer, U. S. Light & Heat Corp., Niagara Falls
PAGE, Arthur A., Assistant Foreman, Tool & Fixture Department, Watervliet Arsenal, Watervliet
POHLMAN, Adolph, Long Island City
ROBBINS, Herbert J., Sales Engineer, Doehler Die Casting Co., Brooklyn
ROTH, Willard E., Testing Engineer, Worthington Pump & Machinery Corp., Buffalo
SHINBROT, Irving, Brooklyn
SMITH, Frank W., Junior Designing Engineer, Locomotive Superheater Co., New York
SWANTON, Allen F., Editorial Assistant American Society Mechanical Engineers, New York
TIMMIS, Pierce, Assistant Service Engineer, Westinghouse, Church, Kerr & Co., New York
WEED, Irving, Construction Manager, H. Robbins Burroughs, New York
WHITE, Byron E., Engineer, Utica Gas & Electric Co., Utica
WILLIAMS, John H., Management Engineer, New York
ZEITLIN, Herbert, Tool Designer, Metal Stamping Co., Long Island City

North Carolina

HENOFER, John P., Mechanical Engineer, Mees & Mees, Charlotte

Ohio

AHLERS, J. A., Sales Engineer, Cincinnati Ball Crank Co., Cincinnati
AUGUSTUS, James M., Laboratory Assistant, Aluminum Castings Co., Cleveland
COUGHLIN, William J., Checker Tool Design, Ohmer Fare Register Co., Dayton
EVERHART, Harold S., Estimating Engineer, Jeffrey Manufacturing Co., Columbus
FIRTCH, William H., Estimator, Jeffrey Manufacturing Co., Columbus
McAUSLAND, Alfred H., Engineer, Bailey Meter Co., Cleveland
McCABE, Frank E., Factory Superintendent, The Grabler Manufacturing Co., Cleveland
ST. CLAIR, Clinton D., B. F. Goodrich Co., Akron
SELLERS, Ernest H., Mechanical Engineer, Hoppes Manufacturing Co., Springfield
SPENCER, George H., Mechanical Goods Salesman, Goodyear Tire & Rubber Co., Akron
THOMAS, Fielder W., Mechanical Engineer, Firestone Tire & Rubber Co., Akron (Re-Election)
VAN HAMMERSVELD, John J. N., Designing Engineer, Warner & Swasey Co., Cleveland
WAGNER, Earl M., Special Representative, Lodge & Shipley M. T. Co., Cincinnati

Oklahoma

MORROW, Thomas W., Jr., Sales Engineer, The Foxboro Co., Inc., Tulsa

Pennsylvania

BAUMANN, Frank J., Mechanical Draftsman, The Barrett Co., Philadelphia
CAMPBELL, Archibald, Turbine Tester, Westinghouse Electric & Manufacturing Co., Essington
CARROLL, Phil, Time Study Man, Westinghouse Electric & Manufacturing Co., East Pittsburgh
CLARK, Clarence P., Engineer in Charge of Construction, South Side Works, Jones & Laughlin Steel Co., Pittsburgh
COULT, Charles C., Draftsman, The Barrett Co., Frankford, Philadelphia
EICHHORN, Theodore F., Experimental & Development Work, Westinghouse Air Brake Co., Wilmerding
FRAY, William, Philadelphia Roll & Machine Co., Philadelphia
FRICK, Clifford H., Supervisor of Operation, Hauto Steam Electric Station, The Lehigh Valley Light & Power Co., Hauto
HOPFER, Cloyd F., Draftsman, Koppers Co., Pittsburgh
LANIGAN, William, General Manager, R. S. Newbold & Son Co., Norristown
NEWBOLD, Richard S., President, R. S. Newbold & Son Co., Norristown
NUZUM, Burl R., Chief Engineer, Hope Natural Gas Co., Pittsburgh
OBERLE, William E., Engineer, Presidents Conference Committee, Federal Valuation of Railroads in the U. S., Philadelphia
TANNER, Julius R., Vice President & General Manager, Pittsburgh Valve, Foundry & Construction Co., Pittsburgh
TRUHAN, Lewis J., Instructor in Experimental Engineering, Univ. of Pa., Philadelphia
VIGELIUS, F. W., Mechanical Engineer, Production Dept., Ingersoll-Rand Co., Easton
ZIMMERMANN, William F., Mechanical Draftsman, The Barrett Co., Frankford, Philadelphia

Rhode Island

SCOTT, Tobias W., Chief Machinery Salesman, Brown & Sharpe Manufacturing Co., Providence

Tennessee

McLAUGHLIN, Oscar B., Superintendent, Lucey Manufacturing Corp., Chattanooga

Texas

LEE, William H., Manager, Railway Division, Galena Signal Company of Texas, Houston

Virginia

ATWATER, William C., Captain U. S. Engineers, Camp A. A. Humphreys
LEE, Clifton Jr., Senior, Lee & Lee, Richmond
MOSELEY, Isaac N., Draftsman, Mechanical Engineer Office, N. & W. R. R., Roanoke
NORDEN, Henry F., Estimating Draftsman, Newport News Shipbuilding & Dry Dock Co., Newport News

Washington

DEVLIN, LeRoy, Manager & Owner, Devlin Lumber Co., Bangor
MURRAY, William E., Chief Boiler Inspector, City of Seattle, Seattle

Wisconsin

BASSLER, Edwin M. Sr., Vice President & Chief Engineer, Bayley Manufacturing Co., Milwaukee
GRIFFITHS, Walter W. Designing, Allis Chalmers Co., Milwaukee
HEADSON, Frank A., Manager, H. W. Johns-Manville Co., Milwaukee
JACKSON, Charles H., Sales Engineer, Bayley Manufacturing Co., Milwaukee
KOLB, William K., Resident Engineer, Kimberly Clark Co., Neenah
SNYDER, William F., Engineer in Charge of Power Plant, Consolidated Water Power & Paper Co., Stevens Point

Argentine

BURNS, Robert, Engineer, Otis Elevator Co., Buenos Aires

Canada

RUST, Elmer P., General Manager, Prince Rupert Dry Dock & Engineering Co., Prince Rupert, B. C.

Central America

AYAU, Manuel S., Talleres Herlihy, Guatemala

Cuba

DeGOICOECHEA, Luciano, General Contractor, Cosculluela & Goicoechea, Havana
FLEDDERMANN, Harry C., Supervising Engineer, Smith, Ames & Chisholm, Havana
MAYO, Ralph, Assistant Engineer, Cuba Cane Sugar Corp., Stewart

England

BENT, Walter G., Manager of Works, Kodak Limited, Wealdstone, Mddlx.
HUMPHREY, Herbert A., Consulting Engineer, Messrs. Brunner, Mond & Co., Cheshire

Territory Hawaii

LAKE, Minor C., Assistant Chief Draftsman, Catton, Neill & Co., Ltd., Honolulu
LYONS, Daniel A., Leading Draftsman, Honolulu Iron Works, Honolulu

CHANGE OF GRADING

Promotion from Associate

Arizona

WALLACE, Jacob H., Checker, United Verde Copper Co., Clarksdale

Connecticut

WIDERBERG, Oscar A., Master Mechanical & Construction Engineer, American Steel & Wire Co., New Haven

New York

OWENS, Charles T., Assistant Chief Inspector, U. S. Shipping Board, New York

Pennsylvania

CONNELLY, Clifford B., Commissioner, Pa. Department Labor & Industry, Harrisburg (Reinstatement)

Promotion from Associate-Member

California

NAESS, Regnvald, Pacific Coast Manager, Philippine Vegetable Oil Co., Inc., San Francisco

Colorado

LARSEN, Charles, Superintendent, The Denver Metals Co., Denver

Illinois

KIEFER, Paul J., Assistant Professor Steam Engineering, University of Illinois, Urbana

Massachusetts

HALE, Henry A., Jr., Senior Partner, H. A. Hall, Jr. & Co., Boston
LORD, Harry C., Mechanical Engineer, J. A. Stevens, Lowell

Minnesota

NORELIUS, Emil F., Consulting Engineer, Minneapolis

Missouri

MAGDEBURGER, Edward C., Chief Engineer, St. Marys Oil Engine Co., St. Charles

New Jersey

EVANS, George A., Assistant Mechanical Engineer, Public Service Electric Co., Newark

New York

BRENNAN, Edward M., Assistant Engineer, Union Seed & Fertilizer Co., New York

Ohio

HORTON, William M., Factory Manager, The Kirk-Latty Manufacturing Co., Cleveland

Wisconsin

SCHERNER, John, Superintendent of Power, Maintenance & Engineering, Federal Rubber Co., Cudahy

Promotion from Junior

California

CRESSLER, George H., Captain, Ordnance Dept., U. S. A., Los Angeles (Reinstatement)

Connecticut

HART, Leon A., Efficiency Engineer, Hartford Automotive Parts Co., Hartford

Illinois

GUTHRIE, Robert G., Director of Tests, Widney Test Laboratories, Chicago

Maryland

SETH, George L., Chief, Mechanical Service, Mask Production Section, Edgewood Arsenal, Edgewood

Massachusetts

GIFFELS, John E. W., Engineer, Haverhill Boxboard Co., Bradford
KLOTZ, Harry J., Engineer, Stone & Webster, Boston

Michigan

LUCHT, Frederick W., Jr., Chief Engineer, Goddard & Goddard Co., Detroit

Ohio

FLANAGAN, Walter N., Steam Engineer, Ohio Works, Carnegie Steel Co., Youngstown

Pennsylvania

KESSLER, Herbert H., Special Engineer, Steacy-Smith Manufacturing Co., York
SPENCER, Robert L., Experimental Engineer, Bethlehem Steel Co., Bethlehem

Wisconsin

PETER, Albert G., Assistant Production Manager, Chain Belt Co., Milwaukee

South America

SERRANO, Luis R., Assistant Engineer, Maestranzas del Ejercito, Santiago, Chile

SUMMARY

New Applications	189
Applications for change of grading:	
Promotion from Associate	4
Promotions from Associate-Member	11
Promotions from Juniors	12
Total	216

Volume 42 Number 6

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

JUNE 1920

A. S. M. E. Affairs

Coming Section Meetings

Atlanta Section.

June 29. Plate Dinner. Election of Officers.

Chicago Section.

June 21. At the Western Society of Engineers' Club. Subject: Refrigeration.

Cleveland Section.

June 8. All-day session. Inspection of industrial plants. Dinner at the University Club. Speakers: Col. Edward A. Deeds of Dayton, and Mr. Cattell, City Statistician of Philadelphia.

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29 WEST 39TH STREET, NEW YORK, U.S.A.

SOCIETY AFFAIRS

Secretary's Letter — A. S. M. E. Council Meeting — Professional Sections News — Section Meetings — Personals — Necrology — Employment Bulletin — Candidates for Membership

The Secretary's Letter

THE success or failure of the Washington Conference of the Engineering Societies set for June 3 and 4 will be more or less determined by the ideals set for the objects of the new organization.

We are all jealous for the standing and influence of our profession and yet how many are doing the one essential thing for its enhancement, namely, making the object of first importance the contribution which we as technically trained men can make to the community?

The Society is the composite of its members. By each individual member serving for the common good, within and without, do we attain that position of esteem by the public which we cherish.

Heroes

Everywhere one sees memorials being erected for the soldiers and sailors who made the supreme sacrifice in the War. Groups of influential citizens exhibit even greater rivalry with regard to the selection of the site for a memorial building than they do with regard to the memorial feature,—at least this is so in my town.

In the Council Notes of the last meeting will be noted the authorization to our Committee on War Participation and Members' Memorial to make a final publication of the list of our members who died in the war.

Has it ever occurred to you that however genuine is the sacrifice to die for a cause, one can render a greater service by living for others?

Without in any way detracting from the service of honor and obligation we hold toward those who have sacrificed their lives that we might live "in the land of the free," I want to point out that we who live may pay back the debt we owe, and more, by living a life of service—that it often takes more heroism to do that, more courage and even a more noble sacrifice.

Calvin W. Rice.
Secretary.

A. S. M. E. Council Meeting

Biography of Dr. Brashear to Be Secured—War Records of Members to Be Published—Syracuse Section Established—Committee Appointments, etc.

A regular meeting of the Council was held at the Congress Hotel, Chicago, on April 19, 1920, the Council being guests of the Western Society of Engineers with the Boards of the other three National Societies.

The death of Dr. John Brashear was made a special order of business, and the President announced that he had appointed Mortimer E. Cooley, Ambrose Swasey, John R. Allen, Sumner B. Ely and Calvin W. Rice as Honorary Vice-Presidents at the funeral of our beloved Past-President and Honorary Member. A committee composed of Ira N. Hollis, Chairman, M. E. Cooley, D. S. Kimball and Ambrose Swasey was appointed to prepare resolutions, and the Publication Committee was authorized to take immediate steps to secure the biography of Dr. Brashear, the manuscript for which was about one-third completed by Dr. Brashear before his death. The Meetings and Programs Committee also offered to arrange a memorial service at the Annual Meeting this year.

War Participation and Members' Memorial. President Miller, Chairman, reported that the Committee had sent out questionnaires to about 1400 members known to have been in military or naval service during the war, and had inserted three notices in Mechanical Engineering; to these 1100 replies had been received. The Committee was authorized in its discretion to publish the war records of members based upon the replies received.

Finance Committee. In accordance with the new amendment to By-Law B-36, the Council voted that the President, who is now authorized to make payments, etc., should be bonded in an equal amount to that in which the Treasurer of the Society is bonded.

Local Sections. The petition of members in Syracuse, N. Y., was granted for a local section there, to be affiliated with the Technology Club of Syracuse. The petition of members for a local section in Utica, N. Y., was also granted, to be affiliated with the Mohawk Valley Engineers' Club.

Relations with Colleges. The petition for a Student Branch at the University of North Carolina was approved.

Professional Sections. A petition for the formation of a Railroad Section was approved. This petition was signed by

W. A. Austin	Selby Haar	J. C. McCune
G. M. Basford	Geo. Hillyer	G. R. Tuska
Samuel Cooke	H. Kaplan	R. V. Wright
L. J. Gersoni	E. B. Katte	

with the collaboration of sixty-five members of the Society.

Research Committee. On the recommendation of Prof. A. M. Greene, Jr., Chairman, the following Sub-Committees of the Research Committee were authorized:

Committee on Cutting Action of Cutting Tools
Committee on Pipe Joints
Committee on the State of the Art in Analysis, Design and Construction of Riveted Joints
Committee on the State of the Art in Torsional Vibration and Stresses Relating thereto.

Boiler Code. Interpretations of Cases Nos. 279, 284, 285, 286, 289 and 290 were approved, and the action of the Executive Committee of the Council in approving Case No. 272 was confirmed.

Code of Ethics. The report of the Special Committee on Code of Ethics was received and ordered printed and referred to the membership of the Society as a whole at the Spring Meeting in St. Louis, and was also referred to the Engineering Council with the recommendation that the Code be considered as a basis for the Joint Code for all engineers.

Steel Roller Chains. The appointment of Alfred F. Masury on this Committee, in place of F. V. Hetzel, was approved.

Rehabilitation of the Blind. At the request of the Chairman, Prof. Charles H. Benjamin, the Committee on the Rehabilitation of the Blind was dissolved with the thanks of this Council, its work in connection with the Red Cross Institute having been completed.

Engineering Council. The admission of the American Railway Engineering Association to membership in Engineering Council was approved.

Patents. A vote of thanks was extended to Mr. E. J. Prindle, member of the Society and Chairman of the Engineering Council Committee on Patents, for his work in connection with the "Nolan" Bill, providing mainly for increased compensation in the U. S. Patent Office.

American Engineering Standards Committee. The addition of the Society of Automotive Engineers, National Electric Light Association and the Electric Manufacturers Council to the membership of the Committee was approved.

Standardization and Unification of Screw Threads. The Council authorized the appointment of Luther D. Burlingame, Will R. Porter, Allen H. Moore and George D. Case, as special representatives of this Society on the Sectional Committee on the Standardization and Unification of Screw Threads, to serve until the expiration of this Council.

Joint Conference Committee. The President and Secretary were empowered to appoint delegates to the "Organizing Con-

ference" called by the Joint Conference Committee of the A. S. C. E., A. I. M. E., A. S. M. E. and the A. I. E. E., to be held in Washington, D. C., June 3 and 4, for the purpose of considering the recommendations of this Committee regarding engineering organization.

Appointments by the President. Arthur R. Baylis was appointed as a member of the Committee on Screw Threads and Threaded Parts.

International Engineering Congress. The Council endorsed the suggestion of the Swedish Engineering Society for an International Engineering Congress to be held in Sweden, June 1921.

Adjournment was taken to meet at the Hotel Statler, St. Louis, Monday, May 24, at 10 a. m., in connection with the Spring Meeting.

CALVIN W. RICE,
Secretary.

Professional Sections News

The Council has granted the petition of the Railroad Section and an election of officers is being conducted. An organizing conference for the Fuels Section was held on May 18 and for the Power Section on May 26. The petition for the Aeronautics Section has now been received by the Council.

Arrangements have been made with the Meetings Committee for five of the new sections to conduct sessions at the next Annual Meeting.

A meeting of the General Committee on Professional Sections was held on May 5 and another is scheduled to be held during June.

Section Meetings

ATLANTA:
May 25. Manufacture of Cotton Goods, by J. T. Wikle of Atlanta, Ga.

BALTIMORE:
May 7. Joint meeting with the Electrical Institute. Some Recent Developments in Heating and Ventilation, by Professor John R. Allen of Pittsburgh, Pa.

BOSTON:
May 5. Methods of Aeroplane Production and Possibilities in Future Commercial Aviation, by Charles H. Tavener.

CHICAGO:
May 21. Luncheon and Excursion to works of Western Electric Co.
May 22. Section entertained the members of the A. S. M. E. en route to the Spring Meeting at the Engineers' Club.

CLEVELAND:
April 27. Joint meeting with Cleveland Engineering Society. Grinding Developments, Achievements and Future Possibilities by Mr. C. H. Norton of the Norton Company, Worcester, Mass.

COLORADO:
May. Joint meeting with the sections of other National Societies.

CONNECTICUT:
NEW HAVEN BRANCH:
May 14. Visit to works of Geometric Tool Co., Westville. Cafeteria luncheon at company's dining room. Development of the Automatic Tapping Head, by one of the engineers of the Geometric Tool Co.

MID-CONTINENT:
May 28. Joint meeting of A. S. M. E. and Oklahoma Section of American Society of Chemical Engineers.

MILWAUKEE:
April 20. Extra meeting of the Society was held under the auspices of the Milwaukee Section of the A. I. E. E. Mr. Calvert Townley, President A. I. E. E., addressed the Society.
April 21. Meeting of Engineering Society of Milwaukee held under the auspices of Milwaukee Section of the A. S. M. E. Engineering Opportunities, by Major Fred J. Miller, President of the A. S. M. E.

ONTARIO:
May. Visited works of Canadian Westinghouse Company; International Harvester Co. and the new generating station of the Dominion Power and Transmission Co.

PHILADELPHIA:
May 25. Annual Dinner. Several prominent men addressed the meeting, and past-chairmen gave short talks.

PROVIDENCE:
May 11. Providence Section formed. A Committee was appointed to plan an active session for 1920-21. Meeting of the Providence Engineering Society followed. Apprenticeship Systems, by Mr. Goss of the Brown and Sharpe Mfg. Co.

SAN FRANCISCO:
April 8. Turbine Reduction Gear for Ship Propulsion, by Mr. W. J. Davis.
May 20. Commercial Development of the Aeroplane, by Dr. Durand of Leland Stanford University.

WASHINGTON, D. C.:
May 17. An Exhibit on Gas and Electric Welding, followed by a dinner, when a short talk was given on "Should Junior Members Vote?" A professional session was held in the evening on Gas and Electric Welding.

PERSONALS

In these columns are inserted items concerning members of the Society and their professional activities. Members are always interested in the doings of their fellow-members, and the Society welcomes notes from members and concerning members for insertion in this section. All communications of personal notes should be addressed to the Secretary.

CHANGES OF POSITION

EDWARD H. MAROT, formerly with the Hyatt Roller Bearing Co. of Newark, N. J., is now sales engineer for the Steel Treating Equipment Company of Detroit, Mich.

MEYER K. EPSTEIN, who was formerly sales agent for the Gilbert & Barker Manufacturing Company of Springfield, Mass., has become sales agent in the Philadelphia district for Tate-Jones & Co., Inc., furnace engineers, of Pittsburgh, Pa.

I. BELLER, until recently connected with the Balbach Smelting and Refining Company of Newark, N. J., in the capacity of designing engineer, has become affiliated with the Chile Exploration Company (Braden Copper Company) of New York City.

WILLIAM V. LOWE, formerly sales engineer with Hess Bright Co. and recently in the engineering and advertising department of Manning, Maxwell & Moore, Inc., has resigned his position to become associated with the Easton Machine Company, South Easton, Mass., as sales engineer.

FRED E. SERMULIN has resigned as test engineer of the Bethlehem Steel Company and has accepted a position with R. H. Warren, consulting engineer, of Easton, Pa.

STERLING H. BUNNELL has resigned his position as chief engineer with R. Martens & Co., Inc., of New York City, and has become associated with the Engineering and Appraisal Company, Inc., with offices in New York City.

HARRY A. HEY is now manager of sales for the Illinois Tool Works of New York. He was formerly associated with the Singer Manufacturing Company of Elizabethport, N. J.

A. Y. DODGE, formerly assistant plant and tool engineer with the Wallis Tractor Company, of Racine, Wis., has accepted the position of chief engineer with the Racine Engineering Company. This company, which has recently been organized, will sell tractors and trucks of its own design and manufacture.

HARRY I. BEARDSLEY has resigned his position as supervising mechanical designer with the Crocker-Wheeler Company, Ampere, N. J., and is now associated with the Western Electric Company, New York City, in the capacity of specification engineer.

WALTER J. BITTERLICH, who has been plant engineer for the Hood Rubber Company of Watertown, Mass., for fourteen years, has resigned his position to become engineering superintendent of the new plant of the Seamless Rubber Company of New Haven, Conn.

EDWARD C. POHLMAN has resigned his position as associate editor of the *American Garage & Auto Dealer* to become president and general manager of the Pohlman-Corcoran Company of Chicago.

FRANK KING, who until recently was chief mechanical engineer of the Columbia Graphophone Company of Bridgeport, Conn., is now affiliated in the capacity of works manager with the Holcomb and Hope Manufacturing Company of Indianapolis.

ALEXANDER A. KOSWICK, formerly assistant comptroller and industrial engineer with the U. S. Steel Construction Company, is now assistant general auditor of the Hearst's Corporations. He has also been elected secretary and a director of the Silico-Portland Cement Company.

AXEL AKERS has become plant engineer for The Alemite Die-Castings and Manufacturing Company of Chicago. He was formerly forge plant engineer for The Symington Chicago Corporation.

ANNOUNCEMENTS

R. B. Renner has been transferred from the New York branch of the Jeffrey Manufacturing Company to the home office of the company at Columbus, Ohio, as assistant engineer, engineering construction.

Lorenzo E. Waite is general superintendent of the Toledo Milling Machine Company, recently organized in Toledo, Ohio, for the manufacture of a line of vertical milling machines.

Walter E. Daggett, formerly engineer of the Osborn Manufacturing Company, Inc., of Cleveland, has recently opened sales and engineering offices in northern Ohio.

James Reed has recently resigned as Commander, Construction Corps, U. S. N., and has become a member of the executive staff of the Los Angeles Shipbuilding & Dry Dock Company, San Pedro, Cal.

Cloyd M. Chapman announces his resignation from the organization of Westinghouse Church Kerr & Co., Inc., and the opening of an office in New York City for the practice of consulting engineering.

A. H. Lane has resigned his position in the Ordnance Engineering Department, at Watervliet Arsenal, N. Y., and is now superintendent of construction with The Cohoes Iron Foundry and Machine Company of Cohoes, N. Y., builders of electric passenger and freight elevators.

Horace L. Howell is manager of the Research and Information Bureau of the National Railway Appliance Company of New York, a department which has been inaugurated in connection with the London Underground Railway of England.

APPOINTMENTS

Richard H. Rice, acting manager of the Lynn, Mass., works of the General Electric Company for the past year and a half, has been appointed manager of the Lynn plant.

Snowden B. Redfield, formerly engineer of tests of the Ingersoll-Rand Company, Phillipsburg, N. J., has been appointed engineer in charge of the Engineering Department of the Easton, Pa., plant of this company.

H. F. J. Porter, consulting industrial engineer of New York, has recently been appointed Secretary of the National Efficiency Society, with headquarters in New York.

William A. Cowell has been appointed engineer in charge of the Rubber Machinery Department of The Wellman-Seaver-Morgan Company at their Akron plant. He was formerly assistant engineer.

William C. Gibson, formerly manager of the small tank department of the William Graver Tank Works, East Chicago, is now manager of tank and plate sales for the same company, which is now known as the Graver Corporation.

NECROLOGY

DEAN BERNARD COBB

Dean B. Cobb, head of the drafting department and in charge of the evening electrical course of the Boardman Trade School, New Haven, Conn., died on April 1, 1920. Mr. Cobb was born on June 11, 1891, in West Haven, Conn. He was educated in the West Haven grammar and high schools and later took courses in mechanical drawing and electrical engineering in night and correspondence schools. From 1909 to 1919 Mr. Cobb was connected with the following firms, all in New Haven: New York, New Haven & Hartford Railroad as electrical draftsman; the Acme Wire Co. as chief electrician; the Southern New England Telephone Co. as chief draftsman; Westcott & Mapes Co. as assistant mechanical engineer and the Greist Manufacturing Co. as plant engineer. In 1919 Mr. Cobb became associated with the Boardman Trade School, with which he was connected at the time of his death.

Mr. Cobb was a member of the American Institute of Electrical Engineers. He belonged also to several fraternal organizations. He became a junior member of our Society in 1919.

ALBERT P. CHAPMAN

Albert P. Chapman, superintendent of power and repairs, of the Ludlow Manufacturing Associates, Ludlow, Mass., died on March 18, 1920, of pneumonia. Mr. Chapman was born in Springfield, Mass., on February 5, 1883. He was educated in the Springfield schools and Worcester Polytechnic Institute, receiving from the latter his B.S. and E.E. degrees. From 1907 to 1914 Mr. Chapman was connected for periods of from six months to three years with the following firms: the General Electric Co., Schenectady, N. Y.; H. H. Richards & Co., Hartford, Conn.; the Public Service Railway Co., Newark, N. J.; the Boston Elevated Railway Co., and the Boott Cotton Mills, Ludlow, Mass. In 1914 Mr. Chapman became associated with the Ludlow Manufacturing Associates, Ludlow, Mass., as electrical engineer; in 1917 he was promoted to the position of superintendent of power and repairs.

Mr. Chapman became an associate-member of the Society in 1917. He was also a member of the American Institute of Electrical Engineers and the Engineering Society of Western Massachusetts.

FREDERICK LINCOLN EMORY

Frederick Lincoln Emory, professor of mechanics and applied mathematics in West Virginia University, died on December 31, 1919. Professor Emory was born in Lunenburg, Mass., on April 9, 1867. He received his common-school education in Lunenburg and attended Worcester Polytechnic Institute, receiving his bachelor's degree in mechanical engineering in 1887. From 1887 to 1889 he was the director of the mechanical and manual-training department of the Washington, D. C., high school. The next two years he spent in establishing and superintending the Trade Schools in the Massachusetts Reformatory at Concord Junction, Mass.

In the fall of 1891 he was selected to establish and take charge of the new department of mechanical engineering in West Virginia University. This he did most successfully, leaving to establish and direct the Industrial Training and Technical High School for the City of Indianapolis, Ind. In the fall of 1895 he entered Cornell University to take post-graduate work and received his master's degree in mechanical engineering in 1896. He then returned to West Virginia University to become professor of mechanics and applied mathematics.

Professor Emory was a frequent contributor of papers to scientific societies and was co-author with Dr. Frederick Truscott in the translation and publication of the Philosophical Essay on Probabilities by Laplace, often referred to as the treatise on "Least Squares." He became a member of our Society in 1894. He was also a member of the Society for the Promotion of Engineering Education.

NATHANIEL OLIVER GOLDSMITH

Nathaniel Oliver Goldsmith, assistant to the president and in charge of operations of the Weir Frog Co., Cincinnati, Ohio, died on February 16, 1920. Mr. Goldsmith was born in Cincinnati on February 27, 1860. He was educated in the schools of that city and Lehigh University, receiving his M. E. degree from the latter in 1883. Upon graduation he entered the drafting room of the Weir Frog Co., with which concern he was connected for thirty-seven years, and through successive promotions attained the position which he held at the time of his death.

Mr. Goldsmith belonged to several clubs in Cincinnati. He became a member of the Society in 1900.

CHARLES W. JOHNSON

Charles W. Johnson, assistant director of engineering of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., died suddenly of pneumonia on April 21, 1920. Mr. Johnson was born in June, 1874, in New Vienna, Ohio, where he received his early education. Later he entered Ohio State University, from which he was graduated in 1896 with the degree of M. E. Upon graduation he entered the employ of the Steel Motor Co., Johnstown, Pa., where he was located for about two years, when he became connected with the Bullock Electric & Manufacturing Co., Cincinnati, Ohio; seven years later he was made superintendent of the works of the Allis-Chalmers-Bullock Co., Ltd., Montreal, Canada.

He entered the employ of the Westinghouse Electric & Manufacturing Co. in 1907, and was soon appointed to the office of chief inspector. Mr. Johnson's promotion was rapid. In 1912 he became general superintendent of the East Pittsburgh Works, and in the early part of 1919 was made assistant manager of works. On January 1, 1920, Mr. Johnson was appointed assistant director of engineering.

Mr. Johnson was also very active in welfare work and social problems. He was a member of the American Institute of Mining and Metallurgical Engineers, the Engineering Society of Western Pennsylvania and several social clubs. He became a member of our Society in 1908.

WILLIAM FRANCHÈRE MONAGHAN

William F. Monaghan, of the engineering department of the New York Edison Co., died on April 10, 1920, of pneumonia. Mr. Monaghan was born on September 12, 1855, in Brooklyn, N. Y. He received his early education at St. John's College, Fordham, N. Y., and finished his college studies and technical training as a mechanical engineer abroad. Upon his return to the United States in 1882 he was engaged for about five years in construction work on stationary engines. He then became connected with the Mt. Morris Electric Light Co. as chief draftsman. About 1893 he entered the employ of the United

Electric Light & Power Co. as mechanical draftsman. He was subsequently employed by the New York Edison Co. in 1900 and was connected with the engineering department of this company until the time of his death.

Mr. Monaghan joined the Society in 1886 and was a life member.

MELVIN B. NEWCOMB

Melvin B. Newcomb, chief engineer of the rubber-machinery department of the Akron works of the Wellman-Seaver-Morgan Co., died on March 13. Mr. Newcomb was born in October 1888 in Newport, N. J. He received his mechanical engineering training at Drexel Institute Evening School and the University of Wisconsin. Mr. Newcomb had been engaged in engineering work with the I. P. Morris Co., Philadelphia; the Allis-Chalmers Manufacturing Co., Milwaukee; the Wisconsin Engine Co., Corliss, and the Firestone, Tire & Rubber Co., Akron. In January 1918 he joined the hydraulic-turbine engineering department of the Wellman-Seaver-Morgan Co., and a few months later was appointed chief engineer of the rubber-machinery department.

Mr. Newcomb was a member of the Cleveland Engineering Society and the Akron Engineering Society. He became a junior member of our Society in 1917.

LEVI S. RICHARDSON

Levi S. Richardson was born in Cincinnati, Ohio, on September 30, 1872. Upon the completion of his high-school course he entered the University of Michigan, where he spent two years. From that time until 1919 Mr. Richardson was connected with the following firms for periods of from one to four years, gaining a wide and varied experience: the Sprague Electric Co., Watsessing, N. J.; R. Hoe & Co., manufacturers of printing presses, etc.; Ford, Bacon & Davis, Engineers; Colgate & Co., the New York Edison Co., all in New York City; the Transit Development Co., Brooklyn; the Lenher Engineering Co., New York; S. Firestone, Rochester, W. S. Barstow & Co., New York, and Westcott & Mapes, New Haven, Conn. In May 1919 Mr. Richardson returned to the employ of Barstow & Co., to work on the erection of a leaching plant in Ironville, Ohio, and a little later on a plant in Hastland, West Virginia. After an illness of six months, following his return from Hastland, he died on April 18, 1920.

Mr. Richardson became a member of the Society in 1909.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Engineering Societies Building.

For Positions Available, see special Bulletin mailed to the entire membership

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 10th of the month preceding date of issue and should be limited to 45 words. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

MECHANICAL ENGINEER GRADUATE, two years' machine shop, three years' drafting, and two years' testing and teaching experience. Desires to connect with some internal-combustion engine manufacturing concern Preferably as research engineer, age 26, salary $2,400 a year. SM-5279.

MECHANICAL ENGINEER AND EXECUTIVE, age 34, fifteen years' experience covering broad field in mechanical lines. Capable organizer or representative, willing to go abroad or to the Orient. Speaks three foreign languages. SM-5280.

ENGINEERING EXECUTIVE, age 24, M. I. T. graduate with one year's experience as hurry-up man in large shipyard and six months' experience in general steam engineering at sea. Would like to locate near Boston. SM-5281.

ENGINEER-PHYSICIST or research engineer; M. E. and M. S. degrees; nine years' experience in responsible charge of engineering investigations along various lines; at present employed as assistant physicist in industrial plant. Desires to get in touch with concern that feels need of having an energetic, broadly-trained engineer who can ascertain facts and apply them to get results. Age 30, married. SM-5282.

EFFICIENCY ENGINEER or production engineer; technical graduate, age 30, married, six years manufacturing experience in rate setting, time study, routing, scheduling, estimating, layout and supervising manufacturing processes. Thoroughly familiar with manufacture of molded insulation. Can supervise and handle men. At present employed as assistant. Would take position as head of department. Location preferred Middle West. SM-5283.

GRADUATE MECHANICAL ENGINEER, 28 years old, married, five years' experience, desires position with industrial concern. Energetic, conscientious, ambitious worker. Will give more consideration to the opportunity for experience and advancement than to initial salary. SM-5284.

ENGINEERING EXECUTIVE with 14 years' extensive experience on automatic labor-saving devices, hydraulic and water-works equipment, gas-engine design and experimental work. Has held position as chief draftsman, assistant chief engineer, consulting and constructing engineer. Desires responsible executive position with possibilities of advancement, preferably along commercial lines. Technical graduate in mechanical and electrical engineering. Age 33; married; location New York City and vicinity. SM-5285.

MECHANICAL ENGINEER, age 24, desires position preferably in Canada, or eastern States. Exceptional experience in both naval marine engineering and stationary engineering. Hold certificates for both branches, besides degree. Has been Second Engineer Officer on ships up to 20,000 I.H.P. Junior A.S.M.E. and Engineering Institute of Canada, Graduate of Institution of Mechanical Engineers. England, and Fellow of Royal Colonial Institute. London. SM-5286.

ENGINEERING EXECUTIVE or General Manager; 20 years' experience covering fully many branches of high-grade mechanical engineering work, four years' mining, and four years' from design to chief executive. Association wanted with firm in far west or southwest in research or development. Minimum salary $10,000 per year. SM-5287.

SALES-PROMOTION EXECUTIVE with ten years' experience advertising and selling mechanical and electrical equipment. Technical education M.I.T., business education Alexander Hamilton Institute. Familiar with principles underlying sound business policies, capable reorganizing existing sales department or establishing sales organization for new company. Location New York City or Boston. SM-5288.

SUPERINTENDENT OR MANAGER; technically-trained engineer in addition to being practical mechanic; 20 years' varied experience in essential and special branches; exceptional ability for getting best results from men and equipment, in established concern or working out new enterprises. Desires connection with reliable concern in need of high-grade service. Principals only. SM-5289.

MECHANICAL SUPERINTENDENT or plant engineer; technical graduate, age 40, experienced design and production work; 12 years' practical experience as maintenance engineer covering design, operation and maintenance of power plants, foundry, machine shop and wood-working machinery. Minimum salary $4,000. SM-5290.

MANUFACTURING EXECUTIVE; graduate mechanical engineer with broad experience in factory management, handling of men and organizing production. Location New York City or immediate vicinity. SM-5291.

GRADUATE MECHANICAL ENGINEER, 36 years old, married. Four years' shop and 11 years' designing experience on structural and mechanical work. Last 7 years on steel-plant layouts. Competent to take charge of work. Permanent position with chance for advancement desired. Present salary $4,000. SM-5292.

MANAGER INDUSTRIAL RELATIONS, or employment manager having charge of welfare activities. Five years' experience in accident prevention, employment, and welfare activities, very successful in organization work and in obtaining results. Technical graduate. Age twenty-seven. Prefer vicinity of Cleveland but will consider other location. Excellent references. SM-5293.

MATERIALS-TESTING ENGINEER, connected with research work of large college laboratory for twelve years, available for position during summer vacation of 1920. SM-5294.

CONSTRUCTION ENGINEER, 15 years' experience in steel plant, furnace and allied equipment, cement, mining and crushing plant construction and machinery design, would consider position as designer and checker, plant maintenance engineer, or purchasing engineer. All round experience, reliable, economical and persevering. Least salary $3,600. SM-5295.

SUPERINTENDENT OR WORKS MANAGER; graduate mechanical engineer, 15 years' experience with large corporation in charge of responsible work covering design, rate setting, costs, production and general manufacturing experience. Ten years with present employers. Desires change to smaller concern where investment can be made. Location Chicago, Ill. SM-5296.

MAINTENANCE OR SALES ENGINEER, technical graduate 1911. Power plant, gas-producer plant, and plant equipment; layout, purchase, installation and maintenance experience; machine and heat-treatment furnace design; reports on projects costs and savings. Now employed in executive position. Married. Location Philadelphia, Wilmington or vicinity. Salary $3,300 per annum. SM-5297.

SUPERINTENDENT OR FOREMAN. Plumber and Pipe fitter. Associate Member; 15 years' experience supervising installations of sanitary systems in industrial plants and large

buildings. Desires connection with industrial plant or construction company. SM-5298.

WORKS MANAGER OR SUPERINTENDENT. Competent executive; broad experience in manufacture of gasoline engines, machine tools and small interchangeable parts; 21 years' practical experience from machinist to plant manager employing 450 hands; technical training; age 41; capable organizer and knows how to obtain coöperation and support of his co-workers; thoroughly familiar with modern production methods and tools; properly qualified to assume entire responsibility of production. SM-5299.

WORKS ENGINEER, graduate mechanical engineer, large maintenance department, desires to change his position for similar one with aggressive organization. Present duties include supervision of power. SM-5300.

MECHANICAL OR SALES ENGINEER, 19 years' experience on flour-mill equipment, gas engines, gas producers, heavy oil engines, motor application, machine-shop equipment, plant layout. Willing to go to Spain, South America, South Russia or China to develop export trade for one or number of firms. At present have charge of large marine shop. Salary, $10,000 contract desired. SM-5301.

RESEARCH ENGINEER on internal-combustion engines. Five years' experience in manufacturing, designing and research. Technical training in mechanical and electrical engineering. Now in charge of laboratory employing 50 men. Familiar with stationary, high-compression oil, kerosene and gasoline truck and tractor engines, age 30, married. Only permanent connection considered. SM-5302.

RESEARCH ENGINEER, graduate E. E.; experienced in research and development of electrical appliances, thoroughly familiar with patents and patent law, about to be registered as patent attorney. Can handle small laboratory or assist in management of large concern; available in 30 days. SM-5303.

INDUSTRIAL ENGINEER wants executive position. Technical graduate, 28, with five years' experience in shops and as production engineer of large shipyard. At present superintendent of metal-working plant. Salary $5,000. SM-5304.

EXECUTIVE—14 years' experience in machine and tool work, 5 years as superintendent in large jobbing-tool shops, doing machine and tool design, making all kinds of jigs, fixtures, punch and die work. Drill jigs, small tools and special machinery. Technical graduate, thoroughly familiar with modern methods of manufacturing and know how to handle men. Desires position in or between Newark, New Jersey, and New York City. SM-5305.

MECHANICAL ENGINEER, technical graduate, 30 years of age, married, experienced in power-house, foundry and factory-building design, and equipment. At present assistant to engineer in charge with duties estimating, purchasing, supervision of drafting, and handling of correspondence with field. Least salary considered $300 per month. SM-5306.

MECHANICAL AND COMBUSTION ENGINEER; Cornell graduate, 30 years old, married; 7 years' experience with power problems in large plants; and is an expert in combustion, also in the running of tests. Would consider sales position where engineering knowledge would prove of value. SM-5307.

GAS ENGINEER; young technical man with 8 years' experience in illuminating-gas business wishes position in executive capacity. Experienced in latest methods of gas manufacture and high and low-pressure distribution and in various types of power-plant machinery. Qualified to serve as works or distribution superintendent or in combination position. Married and employed at present. SM-5308.

GRADUATE MECHANICAL ENGINEER; age 26; five years' experience in foundry-equipment estimating, sales engineering, manufacturing methods, ordnance work, metallurgical engineering, research work, engineering materials, heat treatment and metallography. Prefer position as assistant to sales, research, or metallurgical engineer. Permanent position desired in territory between Cleveland and Boston. SM-5309.

TECHNICAL GRADUATE in mechanical engineering, age 27, desires position where push and conscientious work is required. Have had some experience in drafting and business in semi-executive capacity. The future a greater object than the present salary. SM-5310.

ALLOY ENGINEER, brass and non-ferrous; experienced in production of alloys in billet, slab, and shell form, using pit, oil, and electric furnaces. Technical graduate, at present in responsible work in large casting shop. Experienced in management and executive work. Excellent record. Minimum salary $5,000 SM-5311.

COMBUSTION AND MECHANICAL ENGINEER, technical graduate, 5 years' structural design and testing experience with chaingrate and underfeed stokers. Thoroughly familiar with boiler-room maintenance and operation. Capable of supervising efficiency work in large plant. Also considerable executive experience. Desires responsible position. SM-5312.

SUPERINTENDENT, chief engineer or industrial engineer. Technical graduate mechanical engineer. Twenty years' experience covering heavy-mill design and construction; plant layout, mechanical handling of material, manufacturing and general plant engineering. Specification, design and purchasing of machinery and equipment. SM-5313.

DESIGNING ENGINEER; eight years' experience on heavy machinery, including machine tools, rolling mills, hydraulic machinery, conveying machinery, cranes, etc.; six years' experience on building construction and plant layouts; four years as machinist; qualified to take charge of designing force and to develop new lines; technical graduate; preferred location, Central or Western New York or Eastern Ohio. SM-5314.

COPPER-SMELTER MASTER MECHANIC (English), Spanish speaking, desires position. All round experience. Age 41. SM-5315.

INDUSTRIAL ENGINEER; technical graduate; aged 30; six years' experience designing heavy machinery, labor-saving and safety devices, power plants, piping, heating and ventilating and estimating; two and a half years of efficiency work; thoroughly familiar with planning scheduling, routing, time study and cost accounting, neat and accurate draftsman, with present firm two and a half years, desires change. Location immaterial. SM-5316.

PROFESSOR OF ECONOMIC ENGINEERING, eastern man, ten years' practical experience in construction, organisation and management desires commercial connection. Fair knowledge of French, German and Spanish. Now on Pacific Coast. SM-5317.

PRODUCTION ENGINEER. Graduate mechanical engineer, six years' experience. Executive experience as construction engineer with large corporation and now plant engineer in concern having three plants. Experience includes machine layout and installation, machine operations and processes, building design and construction, power generation and distribution. Location preferred within 100 miles from New York City. SM-5318.

MECHANICAL ENGINEER, aged 31; married; main experience in large modern power-station practice covering design, construction and maintenance, broad experience in refrigeration, testing, inspection and plant layout; desires position handling plant construction, equipment installation, maintenance and power-plant economy. SM-5319.

MILL ENGINEER DRAFTSMAN, member, age 38, nine years' special experience in design and installation of mill layouts, power driver, construction and plant maintenance in addition to general experience, technical training. Good executive, competent to take charge of work of large textile mill or manufacturing plant. Employed and married. SM-5320.

INDUSTRIAL PHYSICIST. Has organized and equipped laboratory for commercial research. During war, directed experimental work on engine performance at high altitudes, with particular reference to oil and lubrication problems. Doctor's degree, Harvard; special field, spectroscopy. Age, 34. Available immediately. Prefers position requiring organizing and research ability. Eastern U. S. SM-5321.

MECHANICAL ENGINEER AND EXECUTIVE; age 34, married, M. E. Stevens; 12 years' engineering experience; at present instructing in marine engineering and naval construction. Experience includes civil engineering, from instrument man up to chief of party and head of office; assistant engineer of manufacturing plant in New York City; as engineer on costs on munitions plants; also expert on gages, checks, fixtures, etc., drives, etc. Salary minimum $4,000. SM-5322.

MECHANICAL ENGINEER; Cornell 1917; graduate; aged 24; married. Shop and drafting-room experience; three years as layout and maintenance engineer, engineer in charge of marine-power plant, estimating and project engineer on conveying machinery. Eastern or central location preferred. Salary desired, $2,400. SM-5323.

FACTORY MANAGER, CHIEF OR MECHANICAL ENGINEER, SUPERINTENDENT. Graduate engineer, employed in important position, in organization of about 10,000, desires change. Seventeen years' practical experience in executive and engineering positions, including manager, on high-grade, interchangeable production in volume. Resourceful, successful; American, 38. Salary, $6,000. SM-5324.

RESEARCH ENGINEER; graduate mechanical engineer, shop trained; three years' mill and shop inspection of equipment and fabricated steel construction; two years' power-plant operation and maintenance; two years' erecting engineer, supervising installation and trouble work in refrigeration; six years' research work with engineering materials and engineering problems; designed apparatus for same, tests of refrigerating machines and other mechanical equipment. Prefer position with refrigerating concern as research engineer but would consider sales or plant-engineering work. Available after July 1. SM-5325.

ASSISTANT, SUPERINTENDENT OR PLANT MANAGER, three years' in shop, production service departments installing production and control methods. At present assistant superintendent in plant making interchangeable machine parts and punch-press work. Some machine designing, twenty-nine years old. Desires to connect with small growing concern. Salary $2,600. SM-5326.

POWER-PUMP DESIGNER, technically trained; graduate of Cornell. Twenty years' experience in design and manufacture of all classes of reciprocating pumping machinery. Specialist in power pumps. Thoroughly familiar with modern production methods in this class of machinery. At present employed, wishes to make change. No preference as to location. SM-5327.

METALLURGICAL PLANT ENGINEER. Graduate mechanical engineer, experience in layouts, design, estimating, contracting, purchasing and erection of steel and concrete, metallurgical plant buildings; conveying, grinding, filtration, calcining machinery; steam and electric-power plants. Now in charge of engineering department of large chemical plant. Desires similar position, sales engineering work, as assistant to manager. Location East of Mississippi. SM-5328.

MECHANICAL ENGINEER. Aged 30, experienced in machine-shop work, machine design, and plant construction and maintenance, desires position as assistant to mechanical or plant engineer where energy and ability will be appreciated. Location preferably Toronto, Canada. SM-5329.

MECHANICAL ENGINEER. Graduate M. I. T., with three years' shop and engineering experience as draftsman and assistant to superintendent, desires position with progressive concern along production or sales engineering lines. SM-5330.

PURCHASING AGENT. Mechanical engineer now in export line is available for new position. SM-5331.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER JUNE 18, 1920

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 195.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by June 18, 1920, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

BERTENSHAW, LOUIS G., Designer, Hardie Tynes Manufacturing Co., Birmingham
GILDER, EDWARD L., Sales Engineer, American Cast Iron Pipe Co., Birmingham
LINEBERRY, CHARLES O., Superintendent, Alabama Power Co., Gorgas
MEADE, RAY, Plant Engineer, Sloss Sheffield S. & I. Co., Ensley
PERSON, WILLIAM M., Assistant Construction Engineer, Semet Solvay Co., North Birmingham
RICHARDSON, ROGER F., Construction Engineer, Semet Solvay Co., Birmingham
WHITAKER, OROON D., Chief Engineer, The Ingalls Iron Works Co., Birmingham

Arizona

JOHNSON, JOSEPH B., Chief Engineer, United Verde Copper Co., Clarkdale
SMITH, TURNER C., Draftsman, A. G. McGregor, Warren

California

BEIDLEMAN, WALTER W., Chief Engineer, Shell Company of California, Tracy
GISLER, JOSEPH F., Superintendent, Federal Telegraph Co., Pala Alto
HOOD, ARCHIE, Machine Shop Superintendent, C. F. Braun & Co., San Francisco
LANE, CARLTON V., Assistant Engineer, Bethlehem Shipbuilding Corp., Lt., San Francisco
METCALF, LESTER G., Refinery Engineer, Union Oil Co., Oleum
SIMMS, FRED B. L., Superintendent, Shell Company of California, Tracy
STONE, CHARLES E., Second Engineer, S. S. Matsonia, Matson Navigation Co., San Francisco
YOUNT, WILLIS H., Tractor Designer, The Holt Manufacturing Co., Stockton

Connecticut

COLEY, HOWARD B., Assistant Mechanical Superintendent, Waterbury Clock Co., Waterbury
DAVIS, GUY E., Commander, U. S. Navy, Groton
HAINES, CHARLES M., Experimental Engineer, Fiala Arms & Equipment Co., Inc., New Haven
LINDHOLM, JOHN I., Chief Designer, Hubbard & Harris, Inc., Bridgeport
McQUOWN, LEONARD A., Process Engineer, Cutlery Section, Winchester Repeating Arms Co., New Haven

Delaware

McREE, JAMES I., Draftsman, Hercules Powder Co., Wilmington
SUTTON, RUSSELL I., Draftsman & Layout Man, E. I. duPont de Nemours & Co., Wilmington
THIES, WILLIAM H., Assistant Power Designer, DuPont Engineering Co., Wilmington

District of Columbia

TOEWS, GUSTAV P., Assistant Engineer of Tests & Draftsman, U. S. Navy Yard, Washington

Georgia

BARKER, BENJAMIN S., JR., Plant Analyst, Goodyear Tire & Rubber Co., Atlanta
MILNER, COBB, Assistant Engineer, State Highway Department of Georgia, Atlanta

Illinois

BLOUCH, LEVI H., Chemical Engineer, Sherwin-Williams Co., Chicago
DeCOSTER, CHARLES J., Consulting Engineer, Moline Plow Co., Moline
HALTERMAN, HENRY J., Efficiency Engineer, A. E. Staley Manufacturing Co., Decatur
HEARTY, FRANK J., District Manager, Edward Valve & Manufacturing Co., Chicago
JAKUBOWSKI, STANLEY A., Student, University of Illinois, Urbana
MOIR, ROBERT B., Engineer, W. A. Jones Foundry & Machine Co., Chicago
SURFACE, WILLIAM E., Vice President, Faries Manufacturing Co., Decatur
TANNER, INOS B., General Superintendent, Jos. E. Nelson & Son, Chicago
WAGNER, ERNEST E., Sales Engineer, J. T. Ryerson & Son, Chicago

Indiana

BAKER, LINNAEUS E., Wayne Oil Tank & Pump Co., Fort Wayne
JORDAN, FRANCIS O., Instructor, Purdue University, Lafayette
ROLLINS, WILLIAM V., Head Draftsman, American Steel & Wire Co., Anderson

Iowa

COWAN, FRANK, Production Manager, Globe Manufacturing Co., Perry

Louisiana

ROBERT, JAMES M., Professor of Machine Design, Tulane University, New Orleans
WIER, JOHN B., JR., Assistant Works Superintendent, Southern Cotton Oil Co., New Orleans

Maryland

ALDEN, VERN E., Assistant to General Superintendent, Consolidated Gas, Electric Light & Power Co., Baltimore
BOLGIANO, CLARENCE P., Assistant Professor Mechanical Engineering, Post Graduate Department, U. S. Naval Academy, Annapolis
CLOTWORTHY, HARRIS A., Engineer, Coupling Department, Bartlett Hayward Co., Baltimore

Massachusetts

DeCORIOLIS, ERNEST G., Chief Engineer, Arthur D. Little, Inc., Cambridge
DEXTER, ALBERT J., Chief Draftsman, Fisk Rubber Co., Chicopee Falls
EWING, THOMAS H., Assistant Engineer, Reed & Prince Manufacturing Co., Worcester
FITZPATRICK, JOHN B., White & Wyckoff Manufacturing Co., Holyoke
HAMILTON, J. EARLE, Master Mechanic, B. D. Rising Paper Co., Housatonic
JENNINGS, THEODORE W., Agent, The Wickes Boiler Co., Winthrop
LESAGE, ERNEST R., Assistant Chief Engineer, Chas. B. Foster & Co., Worcester
WALKER, CHAUNCEY C., Machine Engineer, The Norton Co., Worcester
WILLIAMSON, CHARLES W., Draftsman, Morgan Construction Co., Worcester

Michigan

ARMOUR, JAMES W., Inspector, Sanford Riley Stoker Co., Detroit
BECKWITH, EARL L., Branch Manager, The Under-Feed Stoker Co., of America, Detroit
CARTER, WILBUR A., Engineer Research Department, The Detroit Edison Co., Detroit
COLLINS, CHARLES R., Safety Inspector, Aetna Life Insurance Co., Detroit
McCABE, CHARLES J., Field Engineer, Ford Motor Co., River Rouge
RENTSCHLER, JOHN P., Works Manager, E. W. Bliss Co., Hastings

Minnesota

MUIR, JAMES F., Mechanical Engineer, Toltz, King & Day, St. Paul

Mississippi

ROGERS, THEO. B., Assistant Night Superintendent, Buckeye Cotton Oil Co., Jackson

Missouri

ALLEN, MAYNARD C., Master Mechanic, St. Joseph Lead Co., Rivermines
BLISS, WILLIAM C., Assistant Mechanical Engineer, Scullin Steel Co., St. Louis
BROTHERTON, WALKER P., Sales Engineer, Worthington Pump & Machinery Corp., St. Louis
CRAUN, J. M., Mechanical Goods Salesman, Goodyear Tire & Rubber Co., St. Louis
HAHN, EMANUEL, Engineer, W. A. Zeinicker Supply Co., St. Louis
KUMMING, EMIL, Foreman, Century Electric Co., St. Louis
LARKIN, DAVID, Chief Engineer, Monsanto Chemical Works, St. Louis
McFARLAND, CHARLES T., Resident Engineer, Roberts Filter Co., Kansas City
NORVELL, LORENZO, Manager, Fairbanks Morse & Co., St. Louis
O'NEIL, CHARLES B., Sales Engineer, Fairbanks Morse Co., St. Louis

Nebraska

CROCKETT, BENWICK E., Supervising Engineer, Union Power & Light Co., Omaha
ORR, FRED L., Tractor Testing Engineer, University of Nebraska, Lincoln

Nevada

POMEROY, RALPH E., Smelter Superintendent, Nevada Consolidated Copper Co., McGill

New Jersey

HORN, JAMES M., Instructor of Electrical Engineering, Stevens Institute of Technology, Hoboken
JACKSON, JAMES J., Chief Task Setter,, The Celluloid Co., Newark
PATEMAN, HAROLD B., Designer, Grasselli Chemical Co., Grasselli
STINSON, TENBROECK W., Assistant Engineer, Public Service Electric Co., Newark
STRUTTON, EDWIN B., Apprentice Engineer, Babcock & Wilcox Co., Bayonne
WEINGARTNER, NELSON B., Director of Training, N. Y. Shipbuilding Corp., Camden

New York

AINSWORTH, WILLIAM P. E., Combustion Engineer, N. Y. Steam Co., New York
ANGUS, ROBERT A., Heating & Ventilating Engineer, Westinghouse Church Kerr & Co., Inc., New York
BARTON, CHARLES F., JR., Mechanical Engineer, Thompson Starrett Co., New York
BENTEL, ALBERT, Bronx, New York
BOGART, ADELBERT N., Chief Engineer, Mills Building, New York
BROWNE, BARD, Special Representative, Locomotive Superheater Co., New York
BRUNER, ROY W., Lieutenant (Junior Grade) U. S. Navy, U. S. S. Arizona, New York
BULLARD, HERBERT A., Chief Engineer, Multi Vane Construction Co., Inc., New York
COE, RAYMOND S., Advertising Manager, C. E. Johansson, Inc., Poughkeepsie
COX, HARRY A., Steam Engineer, Brooklyn Edison Co., Brooklyn
DUNN, JAMES E., Syracuse
EARNSHAW, EDWARD H., JR., Worthington Pump & Machinery Corp., New York
ERSLEW, ALBERT J., Sales Engineer, Doehler Die Casting Co., Brooklyn
GORDON, MYRON B., Junior Engineer, C. E. Knoeppel & Co., Inc., New York
HILLEARY, WARREN, Superintendent Royal Indemnity Co., New York
HIRSCH, ROBERT R., Sales Engineer, SKF Industries, Inc., New York; Re-election
JANNSEN, ERNEST, Engineer & Designer, Western Electric Co., New York
LAWRENCE, HOWARD B., Chief Engineer, Gerstendorfer Bros., New York
MAYHEW, BENJAMIN A., National Sugar Refining Co., Long Island City
MUNSCHAUER, G. R., President & Manager, Niagara Machine & Tool Works, Buffalo
PHELPS, MERRICK W., Plant Analyst, The Goodyear Tire & Rubber Co., Syracuse
ROWLETT, RICHARD S., Sales Engineer, Hyatt Roller Bearing Co., New York

SMITH, HUGH, Assistant Superintendent of Production, Watervliet Arsenal, Watervliet
STANWICK, CHARLES A., Electrical Engineer, Western Electric Co., New York
TOPPING, WILLIAM H., Sales Engineer, A. D. Granger Co., New York
VAN POPERING, BERNARD, Sales Engineer, Alberger Pump & Condenser Co., New York
WALKER, CHARLES A., JR., Division Superintendent, Watervliet Arsenal, Watervliet
YOUNG, ARTHUR, Engineer on Consulting Board, Amer. Sugar Refining Co., New York

Ohio

ALLEN, HUGH L., Toledo Scale Co., Toledo
BAKER, WILLIAM, Baker Brothers, Toledo
BOSTON, ORLAN W., Standardization of Indirect Labor, The Cleveland Tractor Co., Cleveland
BRANCHE, ARCH E., Draftsman, Ohio Body & Blower Co., Cleveland
BROWN, ALBERT H., Mechanical Engineer, Hooven Owen Rentschler Co., Hamilton
DUNLAP, PAUL R., Draftsman, The Baker Foundry & Machine Co., Toledo
GILLETT, JOHN, Mechanical Engineer, Mills, Rhines, Bellman & Nordhoff, Toledo
HARTMAN, OSCAR H., Sales Engineer, The Jos. L. Sheldon Engineering Co., Toledo
KINCAID, EARLE B., Purchasing Agent & Employment Manager, The Miller DuBrul & Peters Manufacturing Co., Cincinnati
MOORE, JAMES G., Night General Foreman, The American Tool Works Co., Cincinnati
REIMER, CLARENCE C., Supervisor of Vocational Education, The Niles Tool Works Co., Hamilton
VON ROTZ, ROBERT, Engineer, Cincinnati Ball Crank Co., Cincinnati

Oklahoma

BEREND, OSCAR J., Oil Producer, Tulsa

Pennsylvania

BARRITT, JOHN W., Supervisor of Apprentices, Westinghouse Elec. & Mfg. Co., Lester
BEYER, WILLIAM W., Chief Designer (Mech.), The Philadelphia Electric Co., Philadelphia
BLIZARD, JOHN, Fuel Engineer, Bureau of Mines, Pittsburgh
BROCK, ARTHUR, JR., Proprietor & General Manager, Arthur Brock, Jr., Tool & Manufacturing Works, Philadelphia
BUELL, WILLIAM C., JR., Chief Engineer, Tate-Jones & Co., Inc., Pittsburgh
CONNELL, WILLIAM H., JR., Sales Engineer, Hiller & Jones Co., Pittsburgh
COOLEY, DWIGHT, Design Engineer, The Barrett Co., Frankford, Philadelphia
DUDLEY, DAVID R., Engineer, Hersh & Brother, Allentown
FOGEL, WILLIAM P., Sales Engineer, Day & Zimmerman, Inc., Philadelphia
FROELICH, CLARENCE H., Ordnance Engineer, Bethlehem Steel Co., Bethlehem
GLASBY, JOHN B., Assistant Engineer of Tests, Atlantic Refining Co., Philadelphia
GOTWALS, CHARLES S., Efficiency Engineer, Hess Bright Manufacturing Co., Philadelphia
HEPBURN, WILLIAM G., Machine Tool Salesman, Niles-Bement Pond Co., Pittsburgh
HINGER, A. WILLIAM, Foreign Sales Manager, Baldwin Locomotive Works, Philadelphia
HUME, ARTHUR P., Engineer of Tests American Bridge Co., Ambridge
IVES, GEORGE C., Turbine Inspector, Westinghouse Electric & Manufacturing Co., Lester
JONES, ISAAC H., Works Engineer, Fels & Co., Philadelphia
KERNS, RUSSELL C., Draftsman, Westinghouse Electric & Manufacturing Co., Lester
LAWSON, CHARLES T., Sales Engineer, New Westinghouse Elec. & Mfg. Co., E. Pittsburgh
MESTA, MERLE A., Assistant Production Manager, Mesta Machine Co., Pittsburgh
MILLAR, ROBERT E., Chief Engineer, Fels & Co., Philadelphia
MORETON, ALFRED G., Engineer, General Electric Co., Erie
PINNEY, JABEZ P., Charge Man, Bethlehem Shipbuilding Corp., Bethlehem
REYNOLDS, CHARLES R., Westinghouse Engineer, Westinghouse Electric & Manufacturing Co., Philadelphia
ROHRBACH, GEORGE C., Engineer, Bonney Vise & Tool Works, Inc., Allentown
SAMANS, WALTER, Assistant Chief Engineer, Atlantic Refining Co., Philadelphia
SIGWORTH, ROBERT Y., Power Plant Engineer, Penn State College, State College
SMITH, WALTER, Plant Engineer, Franklin Sugar Refining Co., Philadelphia
SNOWDEN, HOWARD J., Sales Engineer, Baldwin Locomotive Works, Philadelphia
STAHL, DAVID V., William Cramp & Sons Ship & Engine Building Co., Philadelphia
TARLETON, LESLIE S., Instructor in Mechanical Engineering, Univ. of Pa., Philadelphia
TEMPLIN, CHARLES S., Engineer, Hersh & Brother, Allentown
THOMPSON, LOUIS N., Draftsman, Westinghouse Electric & Manufacturing Co., Lester
YANSS, GEORGE W., Spicer Manufacturing Corp., Pottstown
YAO, KWANG YU, Technical Apprentice, Westinghouse Electric & Mfg. Co., Lester

Rhode Island

PINKHAM, ALEXANDER B., District Manager, Feles Engineering Co., Providence

Texas

WEAVER, HAL C., Associate Professor of Mech. Eng., University of Texas, Austin

Washington

WHEELER, HAROLD S., Vice President, Far West Lumber Co., Tacoma
WILSON, WILLIAM W., Acting Leading Mechanical Engineer & Draftsman in charge of Plant Section Drafting Room, U. S. Navy Yard, Puget Sound

Wisconsin

BLISS, WILLIAM D., Professor of Mechanical Engineering, Marquette Univ., Milwaukee
JORGENSEN, RUFUS I., Chief Draftsman, Valley Iron Works Co., Appleton
KAROW, EDWIN A., Toolroom Foreman, Kempsmith Manufacturing Co., Milwaukee
MACK, PERRY E., Chief Engineer, Briggs & Stratton Co., Milwaukee
PRAEFKE, L. A., Tool Engineer, Briggs & Stratton Co., Milwaukee
RADERMACHER, LAURENCE J., Draftsman, Valley Iron Works Co., Appleton
SHANNON, JEAN R., Assistant Chief Draftsman, Kempsmith Mfg. Co., Milwaukee
STARK, JAMES K., Designer, Kempsmith Manufacturing Co., West Allis
THOMAS, MARK S., Designer, Valley Iron Works Co., Appleton
WILSON, JOHN W., Inspector of Boilers, Hartford Steam Boiler I & I Co., Racine

Canada

PATERSON, WILLIAM B., Office Manager, Canadian Service Co., Ltd., Toronto, Ontario

Canal Zone

BUSSE, GROVER C., Marine Designing Draftsman, The Panama Canal, Balboa

Central America

DOUGLAS, HAROLD D., Mechanical Engineer, New York & Honduras Rosario Mining Co., San Huancito, Honduras

Cuba

GATJE, FREDERICK C., Efficiency Engineer, The Cuban-American Sugar Co., Central Delicias, Oriente
HALSTEAD, GEORGE B., Car Engineer, American Steel Co., of Cuba, Havana
MARTIN, ROBERT L., Assistant Electrical Engineer, Elia Sugar Co., Elia Camagney

India

HAYWOOD, CHARLES M., Engineer Salesman, British-American Machinery Co., Ltd., Calcutta

Mexico

SADA, LUIS G., Superintendent of Ceraceria, Cuanhtemac, S. A. Monterey

South America

BINDON, HUGH D., Chief Constructional Engineer, Swifts, Montevideo

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

Missouri

FERGUSON, JAMES W., Manager, Mechanical Goods Sales, Goodyear Tire & Rubber Co., St. Louis

PROMOTION FROM ASSOCIATE-MEMBER

Massachusetts

LEFREN, KARL A. A., Mechanical Engineer, Robert Gair Co., Haverhill

New Jersey

HEIMPEL, EARL F., Chief Engineer, Edison Portland Cement Co., Stewartsville

New York

BAUSCH, CARL L., Superintendent, Bausch & Lamb Optical Co., Rochester

Oklahoma

JABLOW, CHARLES, Professor of Mechanical Engineering, Oklahoma Agricultural & Mechanical College, Stillwater

Vermont

HAMILTON, DOUGLAS T., Advertising Manager, Fellows Gear Shaper Co., Springfield

PROMOTION FROM JUNIOR

District of Columbia

SHORT, FRANK, Captain, Aircraft Armament Division, Ordnance Department, Washington

Louisiana

MOSES, WALTER B., Vice President, The Engineering Sales Co., Inc., New Orleans

New York

MILLER, GARRETT E., Designing Engineer, West India Sugar Finance Corp., New York

Ohio

FREED, LORING, Empire Ohio Chemical Co., Toledo

Pennsylvania

KASSANDER, A. R., Assistant Superintendent, Carbondale Machine Co., Carbondale
TUCKERMAN, GEORGE E., Mechanical Engineer, Ballinger & Perrot, Philadelphia

Wisconsin

MELLOWES, ALFRED W., Manager, Frigerator Division, Briggs & Stratton Co., Milwaukee

Cuba

CLARKE, PHILIP L., Electrical Engineer, Cuba Co., Central Jatibonica, Jatibonica

SUMMARY

New Applications	181
Applications for Change of Grading:	
Promotion from Associate	1
Promotion from Associate-Member	5
Promotion from Junior	8
Total	195

SUMMARY SHOWING AVERAGE AGE AND POSITIONS OF APPLICANTS ON BALLOT CLOSING MAY 22, 1920.

Average age of applicants:	
Members	40
Associates	38
Associate-Members	33
Juniors	25
Captain	1
Chief Engineers	7
Asst. Chief Engineers	2
Colonel	1
Construction Engineer	1
Consulting Engineer	1
Designers	3
Draftsmen	11
Chief Draftsmen	6
Mechanical Draftsmen	4
Engineers	9
Efficiency Engineers	2
Executives (Pres., V. Pres., Secy., Treas., Mgrs.)	31
Works Manager	1
Industrial Engineers	2
Inspector	1
Instructors	8
Lieutenant	1
Machine Designers	5
Assistant Master Mechanics	3
Marine Engineer	1
Mechanical Engineers	11
Asst. Mechanical Engineers	4
Plant Engineers	4
Production Engineer	1
Production Managers	2
Research Engineer	1
Assistant Professors	2
Sales Engineers	7
Sales Managers	1
Sanitary Engineer	1
Superintendents	10
General Superintendents	3
Supervising Engineer	1
Assistant Superintendents	3
Testing Engineer	2
Miscellaneous	53

Volume 42 Number 7

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JULY 1920

A. S. M. E. Affairs

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29 WEST 39TH STREET, NEW YORK, U.S.A.

SOCIETY AFFAIRS

Report of Nominating Committee—Resolutions on Death of Dr. Brashear—Past Presidents Celebrate Fortieth Anniversary of Partnership—New Sections Formed—Local Sections Conference—A. S. M. E. Council Meeting—Section Meetings—Personals—Necrology—Employment Bulletin—Candidates for Membership

Report of the Nominating Committee for 1920

To the Secretary:

This Committee, being the first Nominating Committee to operate under the provision of the report of the Aims and Organization Committee, as adopted by the Council and by the membership of the Society, proceeded to consider the candidates suggested by the various groups of Sections in accordance with the recommendations of the Aims and Organization Committee.

The name of each and every nominee was obtained by previous correspondence with the several Sections.

In choosing the individual for the office to which he was nominated, this Committee exercised particular care as to the fitness of the candidate for the position, and to his willingness and ability to serve, with the view to continuing the progressive work of the Society.

We therefore unanimously submit the following nominees:

For President:
Edwin S. Carman, Cleveland, Ohio.

For Vice-Presidents:
Leon P. Alford, New York, N. Y.
John L. Harrington, Kansas City, Mo.
Robert B. Wolf, Philadelphia, Pa.

For Managers:
Louis C. Nordmeyer, St. Louis, Mo.
Henry M. Norris, Cincinnati, Ohio.
Carl C. Thomas, Baltimore, Md.

For Treasurer:
William H. Wiley, New York, N. Y.

Respectfully submitted,
(signed)
Geo W. Galbraith,
Elliott H. Whitlock,
E. O. Eastwood,
Geo A. Weschler,
Chester B. Lord,
H. P. Fairfield, *Secretary,*
G. W. Parsons, *Chairman.*

June 15, 1920. *Nominating Committee for 1920.*

Resolutions on the Death of Dr. John A. Brashear

At its meeting in St. Louis on May 24, in connection with the Spring Meeting, the Council adopted the following resolutions on the death of Dr. John A. Brashear prepared by a Committee consisting of Dr. Ira N. Hollis, Dean M. E. Cooley, Dean D. S. Kimball and Ambrose Swasey:

Dr. John A. Brashear

In the death of John A. Brashear The American Society of Mechanical Engineers has lost one of its happiest possessions. He was an honor to the profession of engineering, wherein his life was spent among the higher things. He grew up in plain surroundings and in the wholesome atmosphere where wealth does not count. His career was typically American, for he became an engineer through apprenticeship as a workman and achieved his fame as a benefactor of the race through unselfish and kindly service. Everything he did seemed to be a preparation for his important contributions to pure science. His telescopes will be looking out into the depths of space for generations to come and in the contemplation of the Infinite they must exercise a permanent influence upon the materialism of this age of mechanical energy. It was fortunate that our country had a mind trained at the work bench with idealism enough to devote itself to the manufacture of instruments of precision for use in astronomy and physics. His friendship with eminent scientists and his membership in a large number of learned societies made him a most attractive and interesting figure. Without training for oratory, he yet was a most interesting speaker to his colleagues and to the plain people who loved to hear him. He was endowed with that kind of unusual influence that would make one hesitate to do wrong in his presence.

One of the reports of the last tribute paid to him in Pittsburgh contains the words: "In the auditorium sat men and women from all walks of life. There were wealthy men and social leaders who had helped the great philosopher push forward and make possible his life's work which returned them twofold benefits; there were those who had been associated with him in lesser capacities, and others were parents and children from the poor districts whose welfare Uncle John held as dear as his own."

His great funeral wherein he was followed to the grave by rich and poor alike is one of the most encouraging things of American life. No power through political influence, through wealth, or through birth could have brought to the services so many thousands of sorrowing friends to look upon him for the last time. From a poor apprentice he had become the best-known and most universally loved citizen of Pittsburgh. At the International Exposition in San Francisco in 1915 he was accredited by the Governor of Pennsylvania as that state's most distinguished citizen. All would have turned alike to him as one endowed with the finest qualities of our race, and this last farewell in the place where his work had been done is a striking proof that we still cherish in our country the ideals of our forefathers. Not only in his career as an engineer-scientist but in his everyday life, the members of our Society will recall him as a gentleman whose footsteps all would yearn to follow. His married life was perfect, its companionship having been best expressed in the words that he selected for his wife's tomb: "We have loved the stars too fondly to be fearful of the night." There our Society may well leave his memory as an enduring influence for good.

These resolutions were ordered printed in Mechanical Engineering and sent to the members of the family. An account of the life and work of our beloved Past-President was published in the June issue of Mechanical Engineering.

Railroad Section Completes Organization

E. B. Katte, *Chairman,* George W. Rink, *Vice-Chairman,* C. W. Huntington, Henry B. Oatley and W. H. Winterrowd have been elected by letter ballot as the Executive Committee of the new Railroad Section.

A meeting of the Committee will at once be called to appoint sub-committees.

The Section will conduct a session at the Annual Meeting this year and any members having suggestions are invited to communicate them to the chairman at the Society's address.

Aeronautics Section Authorized

The Council has now acted on the petition of members for a Professional Section on Aeronautics, and the Section will be organized as soon as possible.

Mr. Howard E. Coffin, a member of the Special Committee on Professional Sections representing Aeronautics, secured this petition.

The list of 170 names appended to the petition includes some well-known members of the Society in this field: Forrest E. Cardullo, former Chairman of our Buffalo Section; Park A. Dallas, former Chairman of our Increase of Membership Committee at Atlanta; Arthur M. Greene, Jr., Chairman of the Research Committee; A. L. Jenkins, C. E. Lucke, Lionel S. Marks, Melville W. Mix; James Hartness, Past-President of the Society; C. F. Kettering, Past-President of the Society of Automotive Engineers; S. W. Stratton, Director of the Bureau of Standards; and Orville Wright, Honorary Member of the Society, are among those listed.

The register of this section is still open for any who wish to join.

Fuels Section Under Way

W. N. Polakov, Chairman, Prof. L. P. Breckenridge and F. F. Uehling, Secretary, acting as the Organizing Committee of the Fuels Section, have announced the election of the Executive Committee by letter ballot of the Section. The Executive Committee consists of Prof L. P. Breckenridge, Chairman, Prof. G. F. Gebhardt, Vice-Chairman, F. R. Low, Joseph Harrington and F. F. Uehling.

The first meeting of the Executive Committee was held in New York on June 9, and the following two sub-committees were appointed for immediate work to be undertaken:

Sub-Committee on Information: Messrs. E. A. Lucey, C. E. Lucke, C. C. Phelps, W. N. Polakov, F. G. Tryon and Floyd W. Parsons.

Sub-Committee on Meetings and Papers: Messrs. Henry Kreisinger, David Moffat Myers, Arthur L. Rice and George A. Stetson.

The Section expects to conduct a session at the Annual Meeting this year, and the Sub-Committee on Meetings and Papers will immediately proceed to decide on topics for the sessions and to secure papers.

The register is still open for any members who wish to join the Fuels Section. To date 425 have registered

MEDAL STRUCK TO COMMEMORATE FORTIETH ANNIVERSARY OF THE WARNER-SWASEY PARTNERSHIP

Past-Presidents Celebrate Fortieth Anniversary of Partnership

The fortieth anniversary of the partnership of Worcester R. Warner and Ambrose Swasey, founders of the Warner and Swasey Co. and both past-presidents of The American Society of Mechanical Engineers, was celebrated on May 19, 1920.

Born on New England farms in the same year, 1846, Mr. Warner and Mr. Swasey worked on the land until they were nineteen. Then they entered an Exeter, N. H., machine works as apprentices within a few months of each other. They became warm friends and upon the completion of their apprenticeships in 1870 both became employees of Pratt & Whitney, Hartford, Conn.

On May 5, 1880, the two established the firm of Warner & Swasey, their initial investment being their combined savings up to that time. Their first venture was in Chicago, but forty years ago few skilled mechanics were found so far from New England and on that account they removed to Cleveland the following year. The first factory building was constructed in 1881 on the site occupied by a portion of the present plant. From manufacturing machine tools exclusively, the partners soon turned to the designing and construction of telescopes, the first one being completed in 1881. During the following years the firm gained world-wide reputation for the high quality and precision of its astronomical instruments. It made a distinguished record during the war.

An appropriate medal to commemorate the fortieth anniversary of the partnership has been struck by Victor Brenner of New York.

Power Test Codes

The Main Committee on Power Test Codes held its seventh quarterly meeting in the rooms of the Society on June 7. This meeting proved to be a very important one and many of the Individual Committees presented full reports or tentative drafts of the test codes which had been assigned to them.

The committees which presented completed codes in tentative form were No. 1 on General Instruction, No. 7 on Reciprocating Displacement Pumps, No. 8 on Centrifugal and Rotary Pumps, No. 12 on Condensers, and No. 14 on Evaporating Apparatus. Reports of progress containing copies of codes in various stages of development were received from Committee No. 2 on Definitions and Values, Committee No. 9 on Displacement Compressors and Blowers, No. 12 on Water Heating and Cooling Equipment, and No. 16 on Gas Producers. The Committee also discussed certain topics connected with the Test Code on Steam Engines (No. 5) and the Test Code on Hydraulic Power Plants (No. 18), which codes had been presented to the Committee at previous meetings.

As will be seen from the above, the work of this large and important Committee is well under way and it is very probable that some of the codes will be presented to the Council in the early fall. A Circular of Information describing the organization and method of procedure of this Committee has recently been prepared, copies of which may be obtained by those members of the Society specially interested in its work.

New Sections of the Society

At the Spring Meeting the Council approved petitions of the members in Akron and Columbus, Ohio, for local sections. Both of these groups have temporary organizations which will be further developed during the summer and necessary programs and committees appointed to enable them to take their proper

place in the work of the Society in the fall. The Akron Section will pursue its activities in conjunction with the Engineering Society of Akron, with headquarters at 80 South Main Street, Akron, and the Columbus Section with the Columbus Engineers' Club, with headquarters at the Southern Hotel, Columbus.

Engineering Society of Akron Holds First Annual Dinner

The Engineering Society of Akron held its first annual dinner at the University Club, Akron, on June 11. This organization has probably accomplished more in the first year of its existence than any other distinctively local engineering society. It now has a membership of nearly 500, with a paid business manager, permanent headquarters, the nucleus of an engineering library and a monthly bulletin, and it is actively participating in not only the municipal affairs of Akron, but also in state affairs, being a member of the Ohio Technical Societies. Its president, Fred E. Ayre, was present at the recent conference in Washington when the Federated American Engineering Societies was formed. A large part of the credit of the success of this organization is due to Messrs. E. P. Roberts and M. B. Robinson, both members of the A.S.M.E. The new officers of the organization are as follows:

President, G. Gale Dixon, Bureau of Water Works Improvement, City of Akron; Vice-President, M. R. Replogle, Goodyear Tire & Rubber Co.; Directors: B. Dales, B. F. Goodrich Co.; L. G. Swigart, Swigart, Ehrman & Legreid; J. H. Vance, B. F. Goodrich Co.; B. A. Waltz, Portage Rubber Co.

Local Sections Conference

At the Sections Conference held on May 24 at St. Louis, one-half of the sections were represented in spite of the fact that no traveling expenses were paid, and several of the sections had more than one representative of their Executive Committee present. The Committee on Local Sections had invited Mr. J. H. Hamilton, a representative of the St. Louis Section of the American Institute of Electrical Engineers and Dr. S. W. Russe, a representative of the St. Louis Section of the American Chemical Society, to give those present at the luncheon the benefit of their experiences in their respective organizations. President Miller and several members of the Council also attended, and Mr. Miller spoke briefly on the accomplishments of the Local Sections.

Later in the day the Section representatives held an informal conference at which the following conclusions were reached: The Executive Committees in each Local Section will appreciate receiving an expression of sentiment from members of the Society on the question now up for discussion as to giving a vote to Junior members of the Society and whether there should be compulsory promotion after a certain age from the Junior grade. The Local Sections will endeavor to establish a uniform policy of action regarding Student Branches in the territory of any section in order that they may be more closely allied with the work of the Society. Local Sections should "big brother" Student Branches and should consider it a duty to furnish speakers for Student Branch meetings, and if possible occasionally hold joint meetings with them.

Support of the National Department of Public Works Association was discussed and favored. Therefore members, through their Sections, should use their efforts to insure favorable action by Congress on the Jones-Reavis Bill.

The Mechanical Engineering Bulletin, mailed to each member of the Society just prior to the Spring Meeting, was discussed and each Section requested to advise the Secretary of the consensus of opinion of its membership regarding this method of disseminating information regarding the Society's activities. Other matters discussed and favored by the Conference were that Executive Committees of Local Sections hold regular meetings at stated periods rather than have meetings at irregular periods, subject to the call of the Chairman; and that the Program Committees of Local Sections should make out the year's program in advance, secure speakers and stick to the dates and subjects so planned. This will enable the members to plan definitely ahead as to attendance at Local Sections meetings.

A. S. M. E. Council Meeting

Dues of Members Remitted—Local Sections Established at Akron and Columbus, Ohio—Professional Sections on Aeronautics and Fuels Formed—Appointments, etc.

A stated meeting of the Council was held in St. Louis, Mo., on May 24, in connection with the Spring Meeting of the Society.

Spring Meeting, 1921. Chicago, Ill., was chosen as a place of the next Spring Meeting of the Society.

Dues of Members Remitted. The following were declared members without dues, having come within the provisions of B-16 entitling them to remission of dues after having paid for thirty-five consecutive years: G. C. Anthony, C. S. Beach, A. C. Campbell, E. H. Foster, W. J. P. Moore, M. R. Muckle, Jr., R. V. Norris, H. de B. Parsons, C. B. Rowland, P. B. de Schweinitz, J. M. Sweeney, J. I. Wells, and Charles W. Whiting.

The following were declared members without dues, having come within the provisions of B-16 entitling them to remission of dues after having paid for thirty consecutive years and having reached the age of seventy years: William Corry, C. J. Ebbets, Peter Ehlers, Edward H. Jones, R. G. Lewis, Carl J. Mellin, W. J. Muncaster, A. C. Rice, Newell Sanders and D. Shirrell.

Local Sections. Petitions of members to form local sections in Akron, Ohio, and in Columbus, Ohio, respectively, were granted.

Professional Sections. Petitions from members for the formation of Professional Sections on Aeronautics and on Fuels, respectively, were granted.

Standard Tonnage Basis for Refrigeration. The following were appointed as a Committee on Standard Tonnage Basis for Refrigeration and Owners' Method of Determining Rating: Peter Neff, Henry Torrance, F. E. Matthews, John E. Starr, G. T. Voorhees, and Chas. W. Berry.

Research. It was voted to offer the service of the Research Committee to the Engineering Division of the National Research Council.

Boiler Code. Past-President Mortimer E. Cooley was appointed on the Boiler Code Committee in place of Prof. R. C. Carpenter, deceased.

The Committee was authorized to offer representation on its Conference Committee to all Federal Departments utilizing the Code, and to immediately grant the request of the U. S. Bureau of Mines for such representation.

Interpretations Nos. 253, 268, 275, 278, 283, 288, 291 to 294, and 296 to 298 were approved with slight verbal amendments and are published in this issue of MECHANICAL ENGINEERING.

Power Test Codes. Prof. W. J. Wohlenberg was appointed on the Individual Committee on Fuels, and Prof. R. M. Anderson was appointed on the Individual Committee on Refrigerating Machines and Plants.

Resolutions on Death of Dr. Brashear. These were presented by Dr. Ira N. Hollis and accepted, and are published in this issue of MECHANICAL ENGINEERING.

American Engineering Standards Committee. Mr. Elwood Burdsall was appointed on the Sectional Committee on Screw Threads, this being a Joint Committee with the Society of Automotive Engineers under the American Engineering Standards Committee.

Appointments by the President. The appointments of Frank B. Gilbreth and John H. Barr to represent the Society at the meeting of the Engineering Section of the National Research Council in New York on April 27, were confirmed.

The appointment of Prof. R. H. Fernald to represent the Society at the Annual Meeting of The Franklin Institute on May 19, was confirmed.

L. P. Alford, D. S. Kimball, E. S. Carman, Arthur L. Rice, W. B. Gregory, Paul Wright, W. A. Palmer, L. C. Nordmeyer, W. A. Hanley, R. H. Fernald, H. P. Porter and Calvin W. Rice were confirmed as appointees of the Society at the Organizing Conference called by the Joint Conference Committee and held in Washington, D. C., June 3 and 4. An account of this Conference appears elsewhere in this issue of MECHANICAL ENGINEERING.

CALVIN W. RICE, *Secretary.*

Section Meetings

ATLANTA:
June 29. Plate dinner at one of the clubs. Election of officers.

BOSTON:
June 25. Outing—afternoon and evening.

BUFFALO:
April 6. A talk was given on the work of educating blinded soldiers to lines of usefulness, by L. W. Wallace, Director of Industrial Education, Red Cross Institute for Blind, at Evergreen, Baltimore, Md.
May 4. Business meeting; address by Calvin W. Rice, Secy. Am. Soc. M. E.

CHICAGO:
June 8. The Great St. Lawrence, by H. C. Gardner, President of the Great Lakes-St. Lawrence Tidewater Association.

CLEVELAND:
May 25. Joint meeting with Cleveland Engineering Society. Gas Warfare Lessons, by Frederick Pope, of Moses Pope & Trainer, Inc., Consulting Engineers, New York City.
June 8. All-day session. Inspection of Industrial Plants. Dinner at the University Club; Speakers: Col. Edward A. Deeds, of Dayton, O., and E. J. Cattell, of Philadelphia.

CONNECTICUT:
MERIDEN BRANCH:
May 7. Business meeting was held.
May 21. Machine Switching Equipment, by E. H. Everit, Chief Engineer, Southern New England Telephone Co.
June 24. Inspection of Aeolian Co. Factory. Manufacture of Talking-Machine Records, by H. L. Thompson, Superintendent Record Dept., Aeolian Co., Meriden, Conn.; also The Manufacture and Use of Talking-Machine Spring Motors, by E. W. Carruth, Production Manager, Aeolian Co.

NEW HAVEN BRANCH:
June 2. Business meeting. Election of officers.

LOS ANGELES:
May 13. Recent Developments in Physics, by Dr. Charles E. St. John, of Mt. Wilson Observatory.

MILWAUKEE:
May 19. With Milwaukee Engineering Society. The Coming Science of Acoustical Engineering, by Prof. Vladimir Karapetoff, Cornell University, Ithaca, N. Y.

MINNESOTA:
May 17. Annual meeting and dinner. Election of officers.

NEW ORLEANS:
June 4. The Recent Installation of a Large Turbo-Alternator at Niagara, by W. M. White, Chief Engineer, Hydraulic Dept. Allis-Chalmers Co., Milwaukee, Wis.

PHILADELPHIA:
June 4. Business meeting was held.

SAN FRANCISCO:
April 29. Visited the Moore Shipbuilding Co. and the Skandia Pacific Co.

TOLEDO:
June 3. Talk on the Relation of the Engineer to the Public, by Fred J. Miller, President Am.Soc.M.E.

WASHINGTON STATE:
June 9. Meeting and banquet. Speakers: R. M. Dyer, C. W Tubby, and E. O. Eastwood.

PERSONALS

CHANGES OF POSITION

R. S. JOHNSON has resigned as factory manager of the Smalley General Company, Bay City, Mich., to assume a similar position with Parkersburg Machine Company, Parkersburg, W. Va.

J. A. WIDMER has left the employ of the Sperry Gyroscope Company, where he was experimental engineer, to take a position as development engineer with the Square D Company of Detroit, Mich.

EDWIN R. DOUGLAS, formerly of The American Rolling Mill Company, is now connected with The Cincinnati Ball Crank Company of Cincinnati, Ohio.

MICHAEL J. CARROLL has resigned his position as designer with the Dyneto Electric Corporation of Syracuse, N. Y., to become checker for the Remington Typewriter Company, Smith Premier Works, of Syracuse.

EDWARD C. WELLS, until recently engineer with Ford, Bacon & Davis, New York City, is now with The Central Foundry Company in its branch office at Holt, Ala.

M. W. TABER has severed connections as district manager for the H. H. Robertson Company of Detroit, and is now affiliated with the Auto Manufacturers Service Company as vice-president.

O. L. BEAR, formerly construction engineer, Laundryowners National Association, La Salle, Ill., is now associated with the Graver Corporation of East Chicago, Ind.

J. RODNEY SWETTING has accepted a position as investigator in the Cost Reduction Division of the Planning Department of the Western Electric Co., Chicago, Ill. He was formerly employed in the Production Department of the Olds Motor Works, Lansing, Mich.

W. A. THOMAS, 3D, has resigned his position as consulting and marine engineer with Macfarlane, Carmey & Co., New York, and is now with Chas. Cory & Son., Inc., of New York.

NELSON A. ZEIGER has resigned his position with the Eastman Kodak Co. of Rochester, to enter the Engineering Department of The Buckeye Steel Casting Company of Columbus, Ohio.

HENRIK GREGER, formerly consulting marine engineer with Adams, Lovell, Birmingham, Inc., of New York, is now associated with The Hooven, Owens, Rentschler Company, in Hamilton, Ohio.

RALPH MILLER is now with the Ingersoll-Rand Co., Phillipsburg, N. J., having resigned his position as assistant superintendent of the Gulowsen Grei Engineering Corporation of Seattle, Wash.

KENNETH B. MILLER has resigned his position as assistant general engineer with the American Thread Company to join the organization of the Griscom-Russell Company, of New York, in the capacity of development engineer.

BASIL W. DENNIS, until recently assistant superintendent of power with the Ford Motor Company of Detroit, is now with Stone and Webster Company of Boston, as engineer in its mechanical division.

STANLEY P. STEWART has severed his connection with the Bass Foundry and Machine Company of Fort Wayne, Ind., and is now with the Franklin Automobile Company of Syracuse, N. Y.

DEAN M. JOHNSON, formerly sales engineer with the Dodge Sales and Engineering Company of Mishawaka, Ind., is now associated with the United States Rubber Company of New York, as research engineer in the mechanical goods division of the company.

G. W. NIGH has resigned his position with the Burlington Railroad to become associated with the Kewanee Boiler Company of Kewanee, Ill.

JOHN G. SCHABERT has left the employ of A. H. Emery of Glenbrook, Conn., and is now with the Yale and Towne Manufacturing Company in Stamford, Conn.

THOMAS A. NOVOTNEY, formerly sales engineer, the American Radiator Company, Chicago, is now with the Power Efficiency Corporation of Buffalo, N. Y.

RALPH I. ALEXANDER has severed connections with the Rensselaer Polytechnic Institute, where he was an instructor, to become supervisor for the Strathmore Paper Company of Woronoco, Mass.

W. W. TAYLOR is now connected with the International Coal Products Corporation of New York City. He was formerly assistant chief engineer for the American Car Company.

CARL AICHBERGER has resigned his position as secretary and sales manager of The Sandusky Foundry & Machine Co., Sandusky, Ohio, and is now connected with the Fitzpatrick Products Corporation of New York City, in an executive capacity.

LLOYD E. LARSON is now serving as vice-president and consulting engineer for the J. H. Wilhelm, Inc., New York City. He was formerly superintendent of the Gauge and Tool Division, Frankford Arsenal.

OTIS L. MCINTYRE recently resigned as mechanical superintendent for the Cerro de Pasco Copper Corporation and has become associated with the Fuller Engineering Company and the Fuller Lehigh Company of Allentown, Pa.

TERRENCE J. MULVEY, after serving the McEwen Manufacturing Company, Tulsa, Okla., for the past year in the capacity of works manager, has resigned to become associated in business with his brother, D. F. Mulvey, of Montclair, N. J.

ROBERT B. ADAMS, formerly superintendent of the A. J. Savage Munitions Company, San Diego, Cal., is now factory superintendent of the Wilson & Willard Manufacturing Company, of Los Angeles, Cal.

ROBERT R. LASSITER, previously mechanical superintendent of the Richmond Forgings Corporation, Richmond, Va., is now connected with the Dale-Brewster Machinery Company, Inc., of New York, Chicago and Paris. Mr. Lassiter is assistant to the president, with headquarters in New York.

ALBERT H. ISRAEL, formerly Torpedo Testing and Research Engineer for the E. W. Bliss Company, has become Works Manager for the American Mustard Company of Brooklyn, N. Y.

W. FRANK SUTHERLAND, formerly editor of *Power House*, has severed his connection with the MacLean Publishing Company, Toronto, and has accepted a position on the engineering staff of the Deloro Smelting and Refining Company, Deloro, Ontario.

ANNOUNCEMENTS

J. HANSON MITCHELL has accepted a position as plant engineer with the Shuttleworth Brothers Company, manufacturers of wilton and body brussels carpets and rugs, in Amsterdam, N. Y.

HENRY DUSENBERY is secretary of the Ford Regulator Corporation which succeeds The Thomas P. Ford Company of New York. Mr. Dusenbery was sales engineer for the original company.

FRANK F. BOYD, Lt-Com., U.S.N.R.F., who served during the war as senior engineer officer of the *U. S. S. Jupiter* and later as engineer and repair officer at the U. S. Submarine Base at New London, Conn., is now assisting in handling the work of the marine division which the Westinghouse Electric and Manufacturing Company has recently established in its sales office in New York City.

LAWRENCE R. QUINN, formerly major in the Ordnance Department, has assumed the position of vice-president of the Pittsburgh Can Company, Pittsburgh, Pa., in which capacity he is operating as executive head of the company.

LEWIS F. LEVENTHAL, who as chief engineer, *U. S. S. Auk*, U. S. N., has until recently been in active service in sweeping the North Sea Mine Barrage, is now connected with the Hartford Plant of the U. S. Rubber Company.

HARRY MCCARTHY, products engineer for the Walworth Manufacturing Company, has been transferred from the Kewanee Works of that company to South Boston, Mass.

C. B. MANSFIELD, who previous to his service with the Gas Defense Division of the Chemical Warfare Service at Astoria, L. I., N. Y., was with The Palmetto Phosphate Company, Tiger Bay, Fla., is now in the Florida Department of the International Agricultural Corporation, located in Mulberry, Fla.

GEORGE FRIEDKIN has accepted a position as maintenance engineer with the Ingalls-Shepard Forging Company of Harvey, Ill.

HENRY M. NEWHALL, JR., is now president of the Newhall Chain Forge & Iron Co., New Jersey Foundry & Machine Co., and Diamond Expansion Bolt Co., with office in New York City.

RICHARD P. HEWITT, secretary-manager of The General Fire Extinguisher Company of Michigan, having completed active service as a captain in the Engineer Corps of the United States Army, has accepted a position as fire protection specialist with the Grinnell Company, Inc., of Detroit. He has also accepted a new commission as major in the Engineer Section, U. S. A., Reserve Corps.

A. D. ROBINSON, consulting engineer of St. Louis, Mo., has gone to China, where he expects to be for several years, in the interests of Jardine, Matheson & Co., Ltd., Shanghai, China.

THOMAS E. HYDE has resigned his position as works manager and assistant secretary of the Huhn Manufacturing Company of Arlington, N. J.

CHARLES H. HILLS, formerly sales manager with the Seattle branch of the Worthington Pump and Machinery Corporation, is now in the marine department of this company in the New York office.

WALTER H. ADAMS has received his discharge from the U. S. Army and will be engaged as consulting engineer in Pasadena, Cal. Mr. Adams was Captain, Engrs., U. S. A., stationed at Whipple Barracks, Ariz.

JOHN D. CRAWFORD has been transferred from the Akron to the Cleveland office of The Wellman-Seaver-Morgan Company.

ELIOT A. KEBLER, actively identified with iron manufacturing companies for many years and now vice-president of the Schaffer Engineering Company of Pittsburgh, is one of the officers of the Fawcus Machine Company which has recently joined its forces with those of the Schaffer organization for the production of gears and special machinery.

STERLING H. BUNNELL advises that the announcement inadvertently made in the June issue of MECHANICAL ENGINEERING that he had resigned his position of chief engineer of the export and shipping corporation of R. Martens & Company, Inc., is incorrect. Mr. Bunnell has not resigned this position which he has held since the early days of the organization of the business for export trade between America and Russia.

FRANCIS CHIAVERIN has severed his connection as designer with the Hercules Powder Company of Wilmington, Del.

ARTHUR F. BARNES, formerly dean of engineering and professor of mechanical engineering, New Mexico College of Agriculture & Mechanical Arts, State College, N. M., is now associated with Barglebaugh & Whitson, architects and consulting engineers of Dallas, El Paso and Houston, Tex., as mechanical and industrial engineer and manager of the New Mexico-Arizona district.

D. B. MORRIS has been transferred from the Carney's Point to the Repauno Plant of the E. I. du Pont de Nemours & Company, Gibbstown, N. J.

COLONEL EDGAR E. ARISON and L. G. KNAPP are members of the recently organized firm of Arison, Goodwin & Knapp, industrial engineers, Chicago. Colonel Arison has filled many important posts in the Ordnance Department during the past three years and Mr. Knapp was works manager of the Wisconsin Motor Manufacturing Company during the war, bringing that organization up to an unprecedented degree of production under emergency conditions. More recently he has been efficiency engineer with Harsh & Chapline Shoe Company of Milwaukee. Other organizations with which both Colonel Arison and Mr. Knapp have been connected are the Harrington Emerson Co., consulting engineers, and the Atchison, Topeka & Santa Fe Railroad.

CORNELIUS T. MYERS, consulting engineer, formerly with the Quartermaster General's Office in Washington designing the Class B military truck which was started in his Detroit office, is temporarily located in Rahway, N. J. Mr. Myers specializes in motor-truck construction, producing new designs in chassis and component parts, revising old designs, and acting as consulting engineer to purchasers and operators of motor trucks and investors in the motor truck industry.

EDWARD H. MAROT, who has recently become associated with the Steel Treating Equipment Company of Detroit, Mich., is serving this company in the capacity of sales manager, not sales engineer, as was stated in the June issue of MECHANICAL ENGINEERING.

APPOINTMENTS

GEORGE R. BRANDON, formerly engaged in engineering and sales of foundry equipment and cranes, has recently been appointed district representative and sales engineer by The General Combustion Company of Chicago.

W. F. MCCARTY has resigned as chief engineer of The Defiance Machine Works of Defiance, Ohio, and has been elected president and treasurer of The Progressive Engineering and Sales Company, Toledo, Ohio.

BRUCE M. SWOPE has been promoted from the position of assistant master mechanic, Renovo Division, Pennsylvania Railroad, to that of assistant engineer of motive power, Lake General Division, with headquarters at Cleveland, Ohio.

MAXWELL C. MAXWELL, assistant general superintendent of the Yale & Towne Manufacturing Company for several years, has been appointed general superintendent, in direct charge of production and maintenance of the plant.

ALFRED G. NORRIS, of New Haven, Conn., has been appointed district manager for the Western New England District, S K F Industries, Inc.

G. P. SIMPSON has been appointed vice-president and general manager of the Oven Equipment and Manufacturing Company of New Haven, Conn. Mr. Simpson, who has been connected with this company for the past six years, was formerly plant engineer of the Robinhood Ammunition Company of Vermont.

H. M. BRAYTON, who served throughout the war as captain in the Ordnance Department at Frankford Arsenal, Philadelphia, Pa., has been appointed Chief Ordnance Research Engineer at the same station and will have charge of the research department on artillery ammunition.

MAJOR JOSEPH W. HENEZEY, formerly general supervisor of artillery ammunition, U. S. A., has been appointed general superintendent of the Stanley G. Flagg & Company, Stowe, Pa.

NECROLOGY

JOHN JOSEPH CONVERY

John J. Convery, consulting engineer, New York City, died on April 17, 1920. Mr. Convery was born on February 23, 1871, in Worcester, Mass., and received his early education in the schools of that city. He followed the trade of machinist until the age of twenty-three when he secured employment with the Washburn & Moen Co., later the American Steel & Wire Co., Worcester. His ability at designing led to his transfer to the drawing room where he designed improvements on machines for the manufacture of all kinds of springs. Machines and appliances of his designing were greatly responsible for the concern's prestige.

Mr. Convery went to Pittsburgh to obtain experience in rolling-mill design and remained there for about five years. He then became connected with the Midvale Steel Co., Philadelphia. In 1910 he designed an improved automobile-tire machine for wrapping the fabric on the carcass automatically, an accomplishment thought impossible up to that time. He assigned his interests in these machines to the Goodyear Rubber Co., and supervised their construction. About 1912 he opened offices in New York City as consulting engineer.

Mr. Convery became a member of the Society in 1916.

GEORGE GILES

George Giles, general manager and director of the Vancouver Engineering Works, Ltd., Vancouver, B. C., died on April 4, 1920. Mr. Giles was born on July 8, 1869, in Walthamstow, London, England. When a mere boy he left England and went to Canada and there he secured employment with the Reid & Currie Co., and their successors, the Vulcan Iron Works, Westminster, B. C., as "improver" in the foundry and machine shops. He worked up to the position of assistant manager. In 1898 he became connected with Armstrong & Morrison, Ltd., Vancouver, as assistant to the superintendent. Two years later this firm was bought by the Vancouver Engineering Works and Mr. Giles became assistant to the manager with full charge of estimating, costs and production. In 1906 he was promoted to the position of works manager and in 1915 became general manager and director of the firm.

Mr. Giles belonged to several clubs and fraternal organizations. He was also the honorary president of the Metal Trades Employers' Association of British Columbia, and a member of the American Foundrymen's Association. He became a member of our Society in 1908.

CARL JEFFREY HEATH

Carl Jeffrey Heath, who became a junior member of the Society in 1919, died on April 4, 1920. Mr. Heath was born in Winsted, Conn., on April 2, 1895. He was educated at Stockbridge high school, Andover Academy and the Massachusetts Institute of Technology, receiving from the latter his B. S. degree in 1917. Upon graduation he became connected with the Boston office of R. Hoe & Co. as salesman. He resigned from this position in 1918 to enter the United States Army. Upon his discharge in 1919 he became associated with the General Electric Co., Pittsfield, Mass., in the motor-engineering department, where he was located at the time of his death.

HENRY A. PORTERFIELD

Henry A. Porterfield, owner and manager of the Dexter Oil Co., Pittsburgh, Pa., and known as an expert in the testing of oils, died on February 8, 1920. Mr. Porterfield was born in Emlenton, Pa., on May 1, 1863. He attended St. Paul's School in Concord, N. H., and then entered Lehigh University, from which he was graduated in 1883. For a short period he was engaged as a mining engineer in coal regions of Wilkes Barre, Pa. He then became connected with the Cambria Iron Co., Johnstown, Pa., as a tester of steels; he was with this company for ten years and was the first to introduce into their work the testing and mixing of oils. After the Johnstown flood, which so badly crippled many of the industries of that city, Mr. Porterfield entered the employ of the Carnegie Steel Co., Pittsburgh, Pa., where he organized laboratories in the various works of the company for the testing of oils. For many years prior to his death, he managed the Dexter Oil Works.

Mr. Porterfield became a member of the Society in 1890. He belonged also to several university clubs in Pittsburgh.

ALFRED RAYMOND

Alfred Raymond, general manager of the Sewerage and Water Boards, New Orleans, La., died on January 13, 1920. Mr. Raymond was born in New Orleans on May 13, 1865. He received his early education in that city and later attended Tulane University, receiving the B. S. degree in 1895 and the M. E. in 1897. Upon graduation he engaged for a short period in work for the U. S. Geodetic Survey. He then took a position as chemist with the American Sugar Refining Co. In 1889 he was appointed electrician in charge of the meter department of the Edison Electrical Illuminating Co. and the following year was made superintendent. From 1893 to 1895 he was superintendent of construction of the Southern Electrical Manufacturing Co.; from 1895 to 1896 he was superintendent of the Louisiana Electric Light Co., and for the next three years was city electrician of New Orleans.

In 1898 Mr. Raymond was appointed general manager of the operating department of the New Orleans Drainage Commission and when in 1904 this Commission was merged into the Sewerage and Water Board of New Orleans, he retained both the title and functions of general manager.

Mr. Raymond became a member of our Society in 1904. He also belonged to the American Society of Civil Engineers, the American Institute of Electrical Engineers and was an active member and past-president of the Louisiana Engineering Society. His activities were many and unselfish. He was an administrator of the Tulane Fund, associate-architect on the Ursuline Convent, member of the New Orleans Garbage Commission, and during the War chairman of the local draft board. By his death the engineering profession loses one of its most prominent and versatile members.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

TECHNICAL GRADUATES desired, preferably with some practical experience, for position with large manufacturer of high-speed machinery, either in calculating, drafting or engineering departments. Give full details in application. Z-229.

MECHANICAL ENGINEERING GRADUATES, Class of 1920, as student engineers in training course of large company. Excellent opportunity for experience in theoretical mechanical engineering. Location Mass. Z-611.

MECHANICAL ENGINEER for construction work in India, must be American, unmarried and 30 years of age. Must have 3 years experience in outside construction work. Z-737-A.

DIESEL ENGINE DESIGNERS, for stationary and marine. Location Southern California. Only first-class experienced men need apply. Give full particulars. Z-1135.

DESIGNER OF POWER PUMPING machinery experience. In reply state age, experience and compensation required. Address Employment Office. Deane Works, Holycke, Mass. Z-1137.

CHIEF INSPECTOR to have complete control over all inspection. Must be finished mechanic and thoroughly understand inspection of high-grade cabinet work. Expected to improve quality and maintain harmonious relations with department heads. Location New York. Z-1198.

MECHANICAL DRAFTSMAN to design machinery for plant manufacturing drying, grinding and crushing machinery. Knowledge of plant construction as applied to cement mill or allied industries useful although not essential. Position permanent. Age, experience and minimum salary. Location Eastern Pennsylvania. Z-1199.

GRADUATE MECHANICAL ENGINEERS with automobile experience to work on designing in connection with motor trucks. State in detail experience, salary, etc. Location New York City. Z-1210.

GRADUATE MECHANICAL AND ELECTRICAL ENGINEER experienced in car shop work. Competent to keep in first class condition of maintenance sub-surface-contact, electric, street-railway cars, and to develop repair shop for work, selecting and placing proper tools and take charge of such operations when erected. Location New York City. Z-1211.

INSTRUCTOR for technical school in electrical laboratory and class-room work. Duties will include responsibility for an elementary electrical course, and assistance in more advanced course. Must be engineering school graduate with few years' practical experience. Previous teaching experience desirable. Apply by letter stating age, education and experience and enclose recent photograph if available. Location, Brooklyn, N. Y. Z-1214.

TECHNICALLY EDUCATED man around 30 to 35 years with experience in plate and steel

fabrication for office position along sales lines with large iron and steel concern; doing countrywide business. Opportunity to connect with high-grade house, excellent possibilities along commercial lines. Location Chicago. Z-1279.

YOUNG MAN, competent to design and take charge of erection of reinforced-concrete construction to go to South Africa on particular job, good for at least two years. Z-1295.

ENGINEERING GRADUATE experienced in time study and rate setting with considerable experience in timing and working up rates for hand operations. Location N. Y. State. Z-1296.

INSTRUCTOR to teach highway engineering, theoretical hydraulics, hydraulic laboratory and surveying; at least one year practical experience in practice and teaching. Location Brooklyn, N. Y. Z1298.

ENGINEER to teach machine design. Should have at least 4 years' experience. Man under 30 desired. Teaching experience desirable but not essential. Will be in charge of evening classes. Location Brooklyn, N. Y. Z-1299.

ASSISTANT PRODUCTION ENGINEER for machine shop; company manufacturing hoisting, machinery, both in quantity and unit production. Location Brooklyn, N. Y. Z-1305.

DESIGNING ENGINEER for general municipal engineering work. Location Santo Domingo City, D. R. Z-1307.

RESIDENT ENGINEER capable of taking charge of highway construction or harbor improvement for handling work in connection with engineering aid to cities or Provinces. Location Santo Domingo, D. R. Z-1309.

GENERAL BUILDING SUPERINTENDENTS. Must speak Spanish. (3) Location Santo Domingo City, D. R. Z1311.

GRADUATE METALLURGIST for control in research work on steel and its heat treatments. College education and training in microscopic analysis of high-carbon steel, also intimate knowledge of pyromemeters essential. State training, experience and salary desired. Location Philadelphia, Pa. Z-1317.

FOUNDRY SUPERINTENDENT to erect machinery and take charge after completed. Company will make small brass castings. Interest in business if have satisfactory qualifications. Location Paterson, New Jersey. Z1322.

SALES ENGINEER familiar with up-to-date welding processes. Location New York. Z1326.

RESIDENT ENGINEER for public utilities. Must be experienced engineer. Location Pennsylvania, New York and Florida. Three men wanted. Z-1327.

DETAILERS AND CHECKERS for large structural-steel fabricators. Location Ohio. Z-1328.

SHOP SUPERINTENDENT to organize and take charge of small machine shop for manufacture of patented apparatus. Must be familiar with up-to-date machine-shop methods. Knowledge of presswork and electric welding desirable, but not essential. Location near New York City. Z-1329.

CHIEF DRAFTSMAN to take charge of 12 men. Prefer man with engineering knowledge to take over details from engineer. Work to cover design of tools and gauges for small intricate parts. Location Western New York. State salary desired and when available. Z-1340.

INSTRUCTOR for physics department to teach electricity, mechanics and heat. Location Brooklyn, N. Y. Z-1341.

LABORATORY ASSISTANT for physics laboratory including subjects. Location Brooklyn, New York. Z-1342.

INSTRUCTOR IN ENGINEERING drawing and descriptive geometry in middle-western college. Applicant should have B.A. and one or more years experience in shops or drafting room. Location Kansas. Z-1357.

SUPERINTENDENT OF MOTOR EQUIPMENT; high-grade man experienced in maintaining large fleet of trucks. Must be all-around mechanic. Excellent opportunity for advancement. State age, experience, whether married or single and salary expected. Location Chicago. Z-1358.

PHYSICIST. Large manufacturer of optical instruments has opening for physicist preferably with mechanical experience. Location New York State. Z-1364.

MECHANICAL ENGINEER, technical graduate, between 28-35 in advisory capacity for company manufacturing food products. Research work mostly; should be familiar with special machinery especially along lines of food products manufacturing. Salary depending on experience. Location Brooklyn, N. Y. Z-1376.

ASSISTANT WORKS ENGINEER, preferably technical graduate, experienced in construction field. Mechanical engineer with civil-engineering experience or civil engineer with design and installation of chemical plants. Location Virginia. Z-1387.

LAYOUT DRAFTSMEN familiar with layout of complete motor cars, excluding bodies. One familiar with layout of motors; and one man familiar with the layout of chassis parts including front and rear axles, transmission, brake mechanism and clutches. Location Connecticut. Z-1388.

GRADUATE MECHANICAL ENGINEER, with electrical and shop experience for large textile mill. Position will be that of mechanical superintendent and will embrace direct supervision of machine, carpenter, pipe, blacksmith, tinsmith shops, etc. The work will require man with executive qualifications and large amount of tact. State training, age, references, salary and other details necessary for reaching quick decision. Location Rhode Island. Z-1389.

TIME-STUDY MAN, practical and experienced for large up-to-date concern near New York, must be thoroughly familiar with all standard machine tools, be competent to supervise the studying of operations on small interchangeable parts and be able to set piece and bonus tasks on same. For consideration replies must state age, married or single, salary and fully desirable experience in this line. Location near New York. Z-1408.

HEAD PROFESSOR OF MECHANICAL ENGINEERING in southern University. Z-1409.

DESIGNERS AND DRAFTSMEN familiar with diesel engines either of the standard or solid injection types. Location New England. Z-1414.

SUPERINTENDENT on reclamation work in Trinidad. Must be good organizer, capable of taking full charge; be familiar with dipper-dredge work and able to keep equipment running economically. Spanish not necessary. Write full particulars, age and salary desired. Location Trinidad. Z-1419.

PRODUCTION ENGINEER, capable of taking full charge of production department in large manufacturing plant in New York City. Must be able to direct planning, scheduling, follow-up, and handle controls from stores to finished products. Must have occupied similar position as superintendent or supervisor of production at least 3 to 5 years. Exceptional opportunity for right man. State age and salary expected. Fullest particulars in production experience required in reply to have your application considered. Location Long Island City. Z-1421.

MACHINE-TOOL DESIGNER on automatic machinery. Prefer young man under 35, with good initial experience and who can work under direction of chief engineer. Man with practical as well as technical experience desired, and one who can work under guidance, has an analytical mind and original ideas, as the guidance will be general in character. Good opportunity. Location Bridgeport, Conn. Z-1425.

OPERATING ENGINEER for power plant to be assistant to chief operating engineer and to be occupied principally with maintenance. Should be good machinist with some familiarity with operation and care of steam turbines; technical engineering training is not required; some knowledge of Spanish is very desirable but not essential. The plant furnishes power for operation of electric railways and electric light and power in city of Havana and now contains three 12,500 k.w. Westinghouse turbine generator units and two 25,000 k.w. units of same make have been contracted for. Location Havana. Z-1426.

SALES ENGINEERS, young, for leading manufacturer of power-plant specialties to call on power-plant and consulting engineers. High character, dependability, enthusiasm and will to succeed. Broad general education and some knowledge of power plants gained through operating or sales experience. Previous selling experience not essential but an advantage. Prefer man with knowledge of Central and Western New York territory. Initial application by letter only which should state salary expected. Headquarters New York City at start, later if successful, permanent location in Syracuse, New York. Z-1427.

MECHANICAL ENGINEER with aeronautical training. Must be familiar with all designs of aeroplanes and field practice. Must be able to meet executives and government officials. Location Washington and travel. Z-1428.

ASSISTANT PROFESSOR OF MECHANICAL ENGINEERING, technical graduate to assist in laboratory courses take charge of courses in high speed internal-combustion engines and automotive design, which is part of optional course in automotive engineering for seniors in mechanical engineering. Location Michigan. Z-1434.

REFINERY ENGINEER with technical education and good mechanical engineering and oil-refinery experience, who will be able to supervise getting out drawings and in general take care of engineering detail. Salary will depend on man but will not be high at first; organization is growing rapidly and opportunities should be large once man proves ability. Location Mexico. Z-1436.

PLANT ENGINEER, preferably technical graduate with 4 to 6 years' experience; to handle maintenance and millwright work, installation for purchase of tools and machines for large brass foundry and machine shop, with usual auxiliary departments. Engineer will be required to do much of own drafting on layouts in design of special equipment. Man of analytical mind especially on improvement of processes, and with general knowledge of plant-engineering work in brass foundry and machine shop, very little power-plant engineering involved. Ohio. Z-1437.

INSTRUCTOR IN MATHEMATICAL DEPARTMENT, young man. Principal work will be to give elementary course in calculus to engineering students. N. Y. State. Z-1439.

ENGINEER for well-established export concern in China; familiar with steam power-plant electrical, mechanical installations also experienced selling machine tools mechanical, electrical and railway equipment. Opportunity given responsible engineer to enjoy interest in firm. Sail for China from Seattle, July 7th. Give full details experience, photograph, recommendation in first letter. Z-1441.

COST ACCOUNTANT, about 30 years of age, earning capacity $5,000 per annum to join force of consulting engineers devoting their attention to industrial management, public utilities, shipping and allied interest. Initiative, aggressive and tactful. One present employed preferred. Z-1444.

MECHANICAL ENGINEER, familiar with all lines, to handle farming machinery, tractors, rice threshers, saw-mill machinery, marine and stationary internal-combustion engines, sugar machinery and mill supplies. Location Philippine Islands. Z-1454.

PRODUCTION ENGINEER, technical graduate, electrical or mechanical, between 30 and 40 years of age, thoroughly competent to plan, tool-up, organize and maintain efficient production on large scale of fractional motor, in small-motor department of large corporation in New England; man of strong character and personality backed by achievement. Z-1450.

RECENT GRADUATE, in mechanical engineer, two, from college of recognized standing, or men who have done engineering work equivalent thereto, are required by large industry vicinity New York, to carry on research and investigations connected with manufacturing processes, steam production and electric generation. Salary commensurate with abilities. Opportunities unlimited. Z-987.

INSTRUCTOR in steam and gas laboratory, duties to commence September 23. Must be graduate of well-known technical school, experience in teaching laboratory work. Men without teaching experience will be considered if other qualifications are satisfactory. Location, state university, in middle west. R-2212.

TECHNICAL GRADUATE desired for important position with manufacturer of high-speed machinery. Must be mechanical engineer with 5 years' practical experience or 5 years' teaching experience at technical school. State fully

qualifications and experience. Location, Mass. Z-1455.

SMALL MANUFACTURING BUSINESS capable of indefinite expansion, offers unexcelled opportunity to young man of some mechanical ability with special aptitude in organization and managing help; not less than four years' successful experience. To right man, chance is offered to quickly work into entire management and interest in business as owner desires to retire from active detail work. Z-1458.

DIESEL ENGINEER. Man of adequate experience to be chief engineer of electric-light plant in West Indies, containing two Diesel engines and one semi-Diesel engine. Location West Indies. Z-1469.

MEN AVAILABLE

Only members of the Society are listed in the publishehd notices of this section. Copy for notices should be on hand by the 10th of the month preceding date of issue and should be limited to 45 words. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

ENGINEER AND EXECUTIVE, two years' practical education in administration and management, two years' experience construction engineering. Five years' in executive positions large industrial companies purchasing large quantities machinery, planning, management production and operation plant; is seeking major executive position commensurate to his experience. SM-5332.

EXECUTIVE position desired by graduate mechanical engineer, such as sales manager or factory manager. Experienced in manufacturing and building of equipment as well as the marketing of same. Eastern location preferred. SM-5333.

EXPORT EXECUTIVE, mechanical and electrical engineer, technical graduate, age 37, married, having considerable practical experience exporting to all parts of the world, desires connection with manufacturer wishing to develop an export business; knowledge of Spanish and German; good organizer and producer of results. SM-5334.

MECHANICAL ENGINEER, technical graduate, age 25, married, desires position as assistant engineer on industrial work. Four years' experience estimating and design of plant installation, ordnance, etc. Present salary $2,700. New York or vicinity. SM-5335.

MECHANICAL ENGINEER, Columbia, desires opportunity to be assistant to executive or plant manager, or in office of consulting industrial engineer. Five years' experience on construction, power-plant operation and in all departments of large electric power company. Training includes business course. SM-5336.

EXECUTIVE ENGINEER, age 39, technical graduate; open for engagement with progressive organization. Exceptional experience in manufacture of mechanical rubber goods and rubber-insulated wires and cables. Experienced in factory layouts and standardization methods. Has successfully handled labor and organization problems; installed effective methods for increasing production. Eastern Location preferred. SM-5337.

ELECTRICAL AND HYDRAULIC ENGINEER, twenty years' experience as executive in design, construction, maintenance and operation of large hydro-electric plant of 200,000 hp. capacity. Experience includes heavy overhead and underground transmission and distribution systems, power measurement, and preparing power contracts. Is ready to undertake general supervision of electrical development work of any size or act as technical adviser to investment syndicate. Reason for seeking new connection: merger. SM-5338.

MECHANICAL and METALLURGICAL ENGINEER, age 26, married, Cornell graduate, four years' experience. Familiar with all classes of machine work, thorough knowledge of metallurgy. Desires position as metallurgist or assistant to executive in progressive manufacturing concern. Employed at present in directing metallurgical research. New York or middle west preferred. SM-5339.

GRADUATE of W. P. I., M. E. Asso. A. S. M. E. Age 36, married, has had thirteen years' experience in Canada, last five years as advertising manager of large machinery supply house. Desires position anywhere in northern part of U. S. Salary $5000. SM-5340.

MECHANICAL ENGINEER desires position as manager of power generation for syndicates having number of plants. Age 37; 18 years' experience in power-station design, construction and operation. Expert on turbines and condensers and all other power-plant apparatus. SM-5341.

TECHNICAL GRADUATE, 8 years' experience on design, construction and inspection, both mechanical and structural, of industrial plants and power houses. At present employed on pulp mill in Canada. Desires responsible position with concern where initiative can be exercised. Any location. SM-5342.

PURCHASING ENGINEER AND EXECUTIVE, long experience, several years' drafting and as sales engineer; eight years purchasing railway-shop equipment, machine tools and raw materials, including steel products and nonferrous metals; also export experience. Married, age 34, now employed. SM-5343.

WORKS MANAGER OR SUPERINTENDENT, 16 years' executive experience in shop work, designing, inspection production and in machinery installations. Graduate mechanical engineer. Age 37. $5000 minimum. SM-5344.

INSTRUCTOR, mechanical engineer, with varied practical and teaching experience, open for engagement next fall. Prefer opening where energy, personality and initiative are essential considerations. Minimum salary $3000. SM-5345.

MECHANICAL ENGINEER, experienced industrial engineering, office and works; engineering purchases, valuations, surveys. War record as plant and production engineer. Negotiations personally conducted. Supervisor of large contracts, work and forces; reports, estimates. SM-5346.

DRAFTSMAN AND ENGINEER, graduate civil engineering with one year drafting marine and building construction. Three years' construction experience railroad concrete and steel building. Five years' manufacturing experience. Immediately available. SM-5347.

MECHANICAL AND CONSTRUCTION ENGINEER, 8 years' experience in design and supervision of factory and power-plant buildings and equipment. Familiar building design, specifications, and construction, mechanical handling systems, power-plant equipment; heating and ventilating installations; piping, and general layouts. Can take entire charge of design, construction, and maintenance. Age 33. Cornell graduate. SM-5348.

GAS BURNING FURNACES, high-temperature carbonizing ovens. Graduate mechanical engineer with good thermodynamic training and experience on development, constructing, operation and maintenance of such equipment. Salary $300 per month. SM-5349.

MECHANICAL ENGINEER, technical graduate, 28, married. Five years' experience plant construction and layouts, machine and structural design, machine-shop practice and general engineering. Available in 15 days. Preferred location Rhode Island or vicinity. SM-5350.

MECHANICAL ENGINEER and executive; 34; technical education, practical shop experience. Six years as executive along mechanical lines in office, engineering and shop management. Thoroughly familiar with modern methods. Desire connection in East. Minimum salary $4,000. SM-5351.

SALES-ENGINEER, now located in Pittsburgh with large acquaintance in this city and principal cities in Western Pennsylvania and West Virginia. Prefer to sell machine tools, but will considér other lines. SM-5352.

MECHANICAL ENGINEER, technical graduate, 1915, married. At present employed as chief draftsmen in large corporation. Open for permanent position as plant engineer or work of similar character. Capable of handling new design as well as maintenance work of varied nature. Location Philadelphia or vicinity desired. SM-5353.

MECHANICAL ENGINEER, technical graduate. Age 29, married. Seven years of excellent experience on construction, industrial and combustion engineering; also design, development and maintenance of power and industrial plants. Desires permanent connection in executive enginering capacity. SM-5354.

MECHANICAL ENGINEER, 7 years' experience general research work, demonstrated executive ability and energetic producer. Connection with growing concern as research engineer or with progresive firm of consulting engineers. Age 26. SM-5355.

PRODUCTION MANAGER, or assistant to general superintendent, graduate mechanical engineer. One year foundry, seven years' experience as mechanic, timesetter, production engineer and general superintendent. Machine-tool or automatic concern preferred. Location immaterial, age 28, married, minimum to start $350. SM-5356.

FACTORY MAN, 25, five years' varied shop experience including drafting, production and executive work. Technically trained. Any location. SM-5357.

APPRAISAL ENGINEER, 39 married, public utilities, industrial and power operations; experience in layout, installation and operation qualifies for all phases of work. At present engaged but desires advancement with more responsibilities. SM-5358.

MECHANICAL AND ELECTRICAL ENGINEER, 15 years' experience in design, erection and operation of power plants, steam and electrically-driven manufacturing machinery. Qualified as executive to handle many men in all departments, good experience in combustion of bituminous and anthracite coal. Operation and maintenance of extensive heavy equipment are specialties. Salary $7500 per year. SM-5359.

GENERAL SUPERINTENDENT OR PRODUCTION MANAGER; technical graduate, married. Experienced in automobile manufacture and general machinery. Well versed on use of jigs, fixtures, labor-saving devices planning and routing methods. Also experienced in inspection and assembling operations. Now employed as production manager. Location immaterial. SM-5360.

EXECUTIVE ENGINEER or works manager, American, 34, married, technical graduate. Broad experience railroad and industrial shop design, construction, equipment, operation and management. Thoroughly familiar with shop costs, contracts, purchases and stores. Specialized in production, and design and installation of automatic labor-saving devices and machinery. SM-5361.

FACTORY MANAGER, or superintendent; American, age 36, 10 years' experience in manufacture of light and heavy-metal stampings; modern production methods; installation piecework and bonus system of wage payment, successful handling of labor. Salary $6,000 per annum. SM-5362.

STEAM-TURBINE SPECIALIST, 16 years' domestic and foreign experience in development, design, manufacture testing and erection of all types of steam turbines. SM-5363.

INDUSTRIAL ENGINEER, graduate Stevens Institute; 34; specialized on production work for 10 years; early training under nationally known engineer. Varied experience in analysis and improvement of process and investigations of cost of production and improvement of same. Expert in time study in manufacture of typewriters, sewing machines, cream separators, coaster brakes, and metal novelties. At present assistant superintendent of plant that he reorganized over a period of six years. Shop and design. Has handled considerable automatic machinery, especially wire work. Would consider meeting man of similar experience for joint consulting work on production. Salary $5000. Location New York City or vicinity. SM-5364.

MECHANICAL ENGINEER, age 28, married; 7 years' experience design, erection and operation of power-plant and oil refinery, maintenance and construction; salary $3000 first year provided good prospects. Location, middle west. SM-5365.

MECHANICAL ENGINEER, several years' experience in machine design, desires connection with live concern in sales or engineering department. Employed at present, good personality, 26, married. Location, New England, preferably Connecticut. SM-5366.

PROCESS AND EQUIPMENT ENGINEER, with 15 years' experience in production, mechanical and executive positions. Age 34, married, has held positions as tool-room foreman, chief draftsman, factory superintendent, process

engineer and equipment engineer. Eastern location preferred. Salary minimum $4000. SM-5367.

TECHNICAL GRADUATE, in mechanical engineering, 27, single; two years' heavy-machine designing, development and research work, two years' machine-shop practice, desires responsible position with progressive concern. SM-5368.

GRADUATE MECHANICAL ENGINEER, age 25; four years' experience, shop, drafting, production, and commercial work; last two years in executive capacity with industrial furnace concern, doing designing, construction, correspondence, and sales over large territory. SM-5369.

SALES ENGINEER, 30 technical graduate; 5 years' general shop and erecting experience, past 3 years as New York representative of leading electric crane manufacturer. Desires location middle west as assistant to executive of progressive growing company. SM-5370.

MECHANICAL ENGINEER, or master mechanic; 18 years' paper-mill experience. Thorough theoretical and practical knowledge of steam and water power, mechanical drives. Wood, steel and concrete construction. General plant layout and maintenance. Now employed. Salary about $3600. SM-5371.

MECHANICAL ENGINEER, technical degree, 10 years' experience design and development of intricate automatic machines, and specialized types for efficient manufacture. Now chief designer of large corporation. Desire position as executive in charge of design and development work. Vicinity N. Y. City. SM-5372.

PROFESSOR OF MECHANICAL ENGINEERING; 12 years' experience in practically all branches of mechanical engineering. Age 35, married, good record present position. Willing to accept position as associate or assistant in M. E. department of high-grade instruction. SM-5373.

MECHANICAL ENGINEER; 4½ years' assistant building and construction superintendent 3 years' mechanical and building draftsman for large western railroad. Thoroughly versed in reinforced-concrete design and field construction. Structural-steel details and layout. Heating and ventilating power-plant layouts. Steam and oil-engine plants, coaling stations and mill construction. SM-5374.

CONSTRUCTING ENGINEER; available August 1, at present in charge of $6,000,000 power and mining development; 15 years' experience on hydraulic developments, power stations, mining developments, industrial developments, shafts and tunnels in America and foreign countries. Technical graduate, 36. Salary $7,000. SM-5375.

ENGINEERING SALES EXECUTIVE, technical graduate, experienced in engineering and manufacturing. Demonstrated ability in marketing high-grade and alloy-steel castings, alloy and tool steels, steel specialties, etc., over period of years. Familiar heat treatment of same. Executive and administrative ability. Constructive sales promotion. Presence and address. Substantial representation in every respect. $6,000 one year contract. SM-5376.

STUDENT, for summer position in drafting room of shipbuilding concern. SM-5377.

MECHANICAL AND PLANT ENGINEER, American, age 43, married; 18 years' theoretical and practical experience in general plant maintenance and construction, design of power houses and buildings, factory layouts and general equipment work executive. A1 references. Vicinity of Newark preferred. Salary depends on position. SM-5379.

ENGINEER, capable of solving difficult mechanical problems for manufacturing concerns. Labor-saving machinery specialty. SM-5380.

MARINE ENGINEER, technical graduate, holds license as chief engineer and has operated as such, desires to make change from present position as superintendent; qualified and has experience in operation, construction or design of modern steam machinery or Diesel engines. Location vicinity New York. SM-5381.

MECHANICAL ENGINEER, M. I. T. graduate, now employed; 5 years' experience in general plant engineering, maintenance and construction. Experimental and development testing of electric motors and works-management investigation. Desire position involving production and management work with industrial concern. SM-5382.

SALES ENGINEER, or sales manager, graduate mechanical engineer; 13 years' active experience, manufacturing executive and sales engineer; 5 years in last position, no objection to traveling. Have initiative and ability to get results. Location immaterial. SM-5383.

EXECUTIVE INDUSTRIAL MECHANICAL ENGINEER, American; married; technical education, several years in Brazil in charge of large American manufacturing interests and speaking Portuguese fluently. Engaged in pulp and paper-mill work for over 10 years. Successful in handling men. Extensive experience in industrial engineering, cost systems and cost analysis, standardization, purchasing and general management. Was also in American Consular Service. SM-5384.

MECHANICAL ENGINEER, age 34, married; technical graduate with advance degree, member of A.S.M.E.; 13 years' engineering and teaching experience, desires to connect with progressive firm in capacity of designing, constructing, sales, or advertising engineer. Energetic, versatile, and resourceful, with pleasant personality. Location preferred, Middle West. SM-5385.

FOREIGN TRADE, MECHANICAL ENGINEER, 15 years' general engineering experience in U. S. Born and educated in Europe; influential business and social connections abroad and the Orient; conversant in modern languages, married, good personality, excellent references, seeks position with progressive concern. Now available. SM-5386.

MECHANICAL DRAFTSMAN, now employed on important work in U. S. Government research laboratory, desires assignment as draftsman in tropical America. Capable, industrious and progressive. Age 21, unmarried. Will go anywhere, in any capacity that holds prospects. SM-5387.

ENGINEER, 34, technical education, 14 years' practical experience, general plant engineering; design, construction equipment, operation and maintenance of power plants, textile mills, print works and bleacheries, dairy plants, creameries, condensed-milk plants, mechanical refrigeration, pump and filtration plants, industrial housing, welfare, etc.; general power plant tests; specifications for buildings and machinery, purchase of materials and equipment. Married. Location immaterial. SM-5388.

CHIEF DRAFTSMAN, or assistant chief engineer, technical graduate in mechanical and civil engineering. Age 31, married. Eight years' experience as detailer, layout, charter, chief draftsman and mechanical engineer. Power plants and units, electric locomotives, electric traveling cranes, airplane equipment and instruments of precision. SM-5389.

WORKS MANAGER, or general superintendent; 21 years' technical and practical experience, includes six years' electric lighting, tramways and installations, 6 years' machine-shop and railroad drafting and design, six years' sales purchasing and general superintendence in jobbing plant comprising, foundry, machine and boiler shops. Age 37, married. SM-5390.

ASSISTANT TO WORKS MANAGER, or chief draftsman; capable, energetic young man; seven years' practical experience, last three years chief draftsman, in charge of design, tools, jigs, fixtures, gages, automatic machines and various labor saving devices. Has had experience in factory arrangements and manufacturing problems. Possesses inventive ability. Desires change where initiative is required and advancement possible. Location New York or immediate vicinity. SM-5391.

SALES ENGINEER, or representative, associate member, graduate engineer; seven years' broad experience as manufacturing executive, representative, and sales engineer in the crane and foundry equipment lines. Desires to represent company in similar lines in Chicago territory. SM-5392.

INDUSTRIAL ENGINEER, 28 years old, wants position in Philadelphia. Technical graduate with four years' experience as production engineer and manager of materials in machine shops. SM-5293.

WORKS MANGER OR SUPERINTENDENT. Age 35. College training. Experience locomotives, cars, boilers, contractors, equipment, foundry, general manufacturing, contract work. At present employed but seeking an opening in a larger field. SM-5394.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER JULY 17, 1920

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 225.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by July 17, 1920, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

Alabama

ARGO, MALCOLM M., Power Engineer, Sloss-Sheffield Steel & Iron Co., Birmingham

BONDS, ALBERT, Electrician, American Steel & Wire Co., Fairfield

GALLALEE, JOHN M., Professor Mechanical Engineering, University of Alabama, University

GORDON, JOHN F., Plant Engineer, U. S. Nitrate Plant No. 2, Muscle Shoals

NEESON, MICHAEL F., Draftsman, Alabama Power Co., Birmingham

SMITH, ARCHIE, Assistant Superintendent of Shops, Woodward Iron Co., Woodward

STAUVERMAN, EDWARD, Birmingham Sales Manager, Worthington Pump & Machinery Corp., Birmingham

WINTER, IREAL A., Draftsman, Alabama Power Co., Birmingham

Arkansas

MURPHY, MELVIN J., Chief Engineer, Arkansas Light & Power Co., Little Rock

California

BAGBY, WILLIAM L., Assistant Superintendent of Pipe Lines, Shell Company of California, San Francisco

CONANT, DAVID J., Engineer, Western Well Works, Inc., San Jose

JOHNSON, CLARENCE F., Assistant to Chief Engineer, California & Hawaiian Sugar Refining Co., Crockett

LAROS, GERALD, Stanford University, Stanford University

Colorado

VICKLUND, CLAUD A., Draftsman, Sterns Rogers Manufacturing Co., Denver

VICKLUND, ENOCH R., Designer, Sterns Rogers Manufacturing Co., Denver

Connecticut

FITCH, HAROLD W., Assistant Engineer, New York, New Haven & Hudson River R. R., New Haven

HOBART, LOUIS C., Mechanical Engineer, The Baird Machine Co., Bridgeport
PREBLE, ELLICOTT M., Designer, Fafnir Ball Bearing Co., New Britain
SHEA, JOHN J., Standardization Engineer, Russell & Erwin Co., New Britain
STONE, MITCHELL L., Industrial Engineer, Pratt & Cady Co., Inc. Hartford.

Delaware

HEALD, WILLARD R., E. I. duPont Co., Wilmington
ROBINSON, JOHN A., Assistant Plant Engineer, The Krebs Pigment & Chemical Co., Newport
ROSENFELT, MAX J., Sanitary Engineer, E. I. duPont de Nemours Co., Wilmington.

District of Columbia

HAVEN, CLYDE E., Assistant Physicist, Bureau of Standards, Washington

Georgia

LOEB, ALBERT L., Sales Engineer, Atlanta Utility Works, East Point

Illinois

DRINKWATER, EDGAR L., Architectural Heating & Ventilating Engineer, City of Chicago, Chicago
JEHU, WALTER L., General Superintendent, The Isko Co., Chicago.
McDONALD, WILLIAM, Assistant Supervisor, Engineers' Department, Swift & Co., Chicago
MINARD, DAVID P., Divisional Efficiency Engineer, Central Illinois Public Service Co., Mattoon
MORROW, SAMUEL L., Sales Engineer, Link Belt Co., Chicago
SCHWEISTHAL, FRED G., Assistant Engineer, Stewart Warner Speedometer Corp., Chicago
TATE, JAMES, Editor, Popular Mechanics Co., Chicago
TOPPAN, W. R., Manager, Railroad Department, Graver Corp., Chicago
WARD, WILLIAM H., Mechanical Engineer, Jas. N. Hatch, Chicago
WILSON, JOHN E., Traveling Engineer, Swift & Co., Chicago

Indiana

CHILDERS, FOUST, Assistant Supervisor of Assembly, General Motors Corp., Anderson
McWORKMAN, DELAMAR, General Manager, Diamond Chain & Manufacturing Co., Indianapolis
PAUL, WALTER E., Assistant General Foreman, Nordyke & Marmon Co., Indianapolis

Iowa

JOY, WARREN W., Sales Engineer, The Fisher Governor Co., Marshalltown
WERTZ, AUSTIN L., General Manager, Morrison Bros., Dubuque

Maryland

PILLSBURY, HORACE W., Lieutenant Commander U. S. Navy, Annapolis

Massachusetts

BLAKE, ARTHUR H., Wollaston
BONNAFE, OLIVER W., Mechanical Engineer, Lapointe Machine Tool Co., Hudson
BROWN, CARL D., Assistant Chief Draftsman, Draper Corp., Hopedale
CAMPBELL, VERNON A., Export Manager, Reed Prentice Co., Worcester
CHAPMAN, WILLIAM H., Grinding Engineer, Norton Co., Worcester
DOWS, HAROLD W., Instructor, Worcester Polytechnic Institute, Worcester
ENGELHARD, FREDERICK H., Member of Firm, Frank Engelhard & Sons, Springfield
EVELETH, CHARLES F., Mechanical Engineer, French & Hubbard, Boston
KINGSTON, ROBERT S., Sales Engineer, Niles Bement Pond Co., Boston
McINTYRE, JAMES, Designing Draftsman, Anglo-American Textile Co., Abington
MAHONY, RALPH G., Assistant Instructor, Massachusetts Institute of Technology, Cambridge
MICHELSEN, DONALD S., General Manager, Worcester Pressed Steel Co., Worcester
MOULTON, ROBERT S., Assistant Secretary, National Fire Protection Association, Boston
OSBORNE, MAURICE M., Engineer, Monks & Johnson, Boston
ROSS, JOHN A., Treasurer, The Frank E. Ross Co., Boston
SHEPARD, HENRY B., Sales Engineer, Lewis Shepard Co., Boston
SMITH, ALBERT T., Chief Draftsman, Parks-Cramer Co., Boston
SOUTHWICK, WILLIAM S., Engineer, Clinton Division, Wickwire Spencer Steel Corp., Clinton
WILLIAMS, HAROLD A., Supervisor of Maintenance, Hood Rubber Co., Watertown

Michigan

ABBOTT, PAUL W., Chief Inspector, Lincoln Motor Co., Detroit
JOHNSON, ALVIN B., Business Manager, The Detroit Commercial Eng. Co., Detroit
LINDFORD, STEN O. V., Chief Draftsman, Edmunds & Jones Corp., Detroit
LYNES, H. E., Detroit
MILWARD, HARRY L., Supervisor of Field Construction, Ford Motor Co., Detroit
TEEL, HENRY C., Factory Manager, Reo Motor Car Co., Lansing

Mississippi

REID, WILLIAM M., Canton Light & Water Works, Canton

Missouri

CALHOUN, LESLIE D., Draftsman, Busch Sulzer Bros., Diesel Engine Co., St. Louis
DRAKE, OSCAR McN., Salesman, Fairbanks Morse & Co., St. Louis
ECKSTEIN, GEORGE F., President, E. M. & W. Engineering Co., St. Louis
HICKEY, ROBERT B., Mechanical Engineer, Century Electric Co., St. Louis
LAMBERT, CARL F., Member of Firm, Burns & McDonnell, Kansas City
MORISON, RODERICK JOHN G., Secretary E. M. & W. Engineering Co., St. Louis
PHILLIPS, DANIEL W., General Shop Superintendent, Heine Safety Boiler Co., St. Louis
REICHARD, HARRY G., Student, Washington University, St. Louis
THUNEN, GEORGE W., Power Engineer, St. Louis Smelting & Refining Works of National Lead Co., St. Francis
YOUTSEY, FLOYD S., Chief Engineer, St. Louis Smelting & Refining Works of National Lead Co., St. Francis

Montana

SMITH, MILES C., Assistant Superintendent Maintenance, Valier-Montana Land & Water Co., Valier

New Jersey

BELLOFF, ARTHUR B., Federal Shipbuilding Co., Kearney
ELY, ALLEN J., Engineer, Standard Oil Co. of New Jersey, Elizabeth
FYKE, FRANK C., Standard Oil Co., Elizabeth
GOLDSTON, LEONARD, Assistant Engineer of Works, Ind. Lamp & Wire Co., Weehawken
GREGORY, HAROLD D., Newark
HEUSER, CHARLES J., Architect & Mechanical Engineer, Forstmann & Huffmann Co., Passaic
JOHNSON, CHARLES H., Assistant to Chief Engineer, Federal Shipbuilding Co., Kearney
KENDING, ERNEST K., Driver-Harris Co., Harrison
KLEIN, SIDNEY, Engineer, Worthington Pump & Machinery Corp., Harrrison
SPARR, ARTHUR H., Construction Engineer, Magor Car Corp., Passaic
STAPLES, JOHN A., Engineer & Chemist, British American Metals Co., Inc., Plainfield
WIBOM, ERIC G., Engineer, Standard Oil Co. (N. J.), Bayonne

New York

ALPERT, SAMUEL, Estimator, Honolulu Iron Works Co., New York
ALTHAUSE, NORMAN K., Assistant Engineer, Consulting Construction Engineers' Office, Guggenheim Brothers, New York
ANDERSON, GUSTAVE A., Tool Engineer, Service Engineering Co., New York
BRAND, MAURICE B., Designing Engineer, The Elbee Co., New York
CERRETA, JOSEPH M., Mechanical Draftsman, The Sperry Gyroscope Co., Brooklyn
CHAMBERLAIN, SAMUEL H., JR., Experimental Engineer, International Time Recording Co. of N. E., Endicott
COLE, ROBERT T., Department Manager, Lockwood Sprinkler Co. of Mass., Buffalo
CORBETT, LAWRENCE W., Superintendent, Electro Bleaching Gas Co., Niagara Falls
DAVOS, LAWRENCE S., Proprietor, Consul Engineering Co., New York
DOWLING, EUGENE, General Manager, Steel Industry Department, H. W. Johns Manville Co., New York
DYER, ORVILLE K., Engineer, Buffalo Forge Co., Buffalo. Re-Election
FLOYD, HAROLD A., Engineer, Union Carbide Co., New York
GAMBLE, WILLIAM J., JR., Superintendent Vulcan Steam Forging Co., Buffalo
GRIGORENKO, VICTOR V., Machine Designer, Service Engineering Co., Inc., New York
HALLORAN, FRANK E., Assistant Torpedo Engineer, E. W. Bliss Co., Brooklyn
HARVEY, WILLIAM D., Regional Sales Manager, Allied Machinery Co. of America, New York.
HENNIG, WALTER A., Assistant Plant Engineer, Pierce Arrow Motor Car Co., Buffalo
HEROD, WILLIAM R., General Electric Co., Schenectady
HOWELL, BURT A., Assistant Plant Engineer, Pierce Arrow Corp., Buffalo
JENNINGS, WALTER F., Mechanical Engineer, Henry L. Doherty, New York
KELLEY, W. MORTON, Sales Engineer, The Roto Company, New York
KEMP, HAROLD A., Superintendent Power Plant, Dunlop America Ltd., Buffalo
KILLION, WILLIAM V., Salesman, H. W. Johns Manville Co., New York
KRASH, BEN, Construction Engineer, Otis Elevator Co., New York
LASKER, WILLIAM W., JR., Brooklyn
LEACH, CHARLES H., Mechanical Engineer, Alberger Heater Co., Buffalo
LEDERER, E. R., Manager, Atlantic Gulf Oil Corp., New York
McCONNELL, EDWARD B., Sales Engineer, M. H. Treadwell Co., New York
McKIBBEN, FRANK P., Professor of Civil Engineering, Union College, Schenectady
MARKS, ALEXANDER, Otis Elevator Co., New York
MERENESS, KNEELAND A., Tank Supervisor, Smith Premier Typewriter Works, Syracuse
MILES, GORDON W., Designer & Draughtsman, Perrin & Marshall, New York
MULLAN, JOS. J., Sales Engineer, C. H. Wheeler Manufacturing Co., New York
PETERSON, ADOLPH, Lieutenant, U. S. Navy, Buffalo
PETERSON, AMOS G., Assistant Sales Manager, Buffalo Steam Pump Co., Buffalo
POTTER, DANIEL F., Sales Engineer, Robertson Cataract Electric Co., Buffalo
PROKOFIEFF, IVAN M., Vice-President, Bureau Technique Francais, Ltd., New York
REYNELL, CARLETON, Purchasing Engineer, American Sugar Refining Co., New York
RICE, HOWARD C., Factory Manager, C. Kurtzmann & Co., Buffalo
RICHMOND, KENNETH C., Industrial Engineer, Miller, Franklin, Basset Co., New York
SAHLIN, E. ALBERT, Brooklyn
SCHELLING, ROBERT F., Engineer in Experimental Laboratory, Pierce Arrow Motor Car Co., Buffalo
SCHNABEL, FERDINAND, President, Deschanel Engineering Corp., New York
SCHULENBERG, WILLIAM L., Maintenance Engineer, American Locomotive Co., Dunkirk
SPENCER, ALBERT W., Estimating Engineer, Pratt Engineering & Machine Co., New York
STREZYNSKI, GEORGE J., Teacher and Manager, Polish Evening Technical School, New York
TICHENOR, CARL M., Assistant General Manager, Pierce Arrow Motor Car Co., Buffalo
WELLER, GERGE L., General Superintendent, Corrugated Bar Co., Buffalo
WELLS, JOHN H., Designing Engineer, J. H. Wells, New York
WITTLINGER, CARL A., Plant Engineer, Tottenville Copper Co., Tottenville
ZADEMACH, ERICH R. L., General Manager, Home Devices Corp., New York
ZIEGLER, WILLIAM C., Industrial Engineer, Ritter Dental Manufacturing Co., Rochester

Ohio

ELFRING, JOHN B., Tool Superintendent, Cincinnati Milling Machine Co., Cincinnati
HAAS, CHARLES E., Chief Inspector, The American Multigraph Co., Cleveland

HAYES, CHARLES H., Foreman, Niles Tool Works Co., Hamilton

HEIDENREICH, GEORGE, District Representative, Ohio Blower Co., Cleveland

KNODE, RUSSELL W., Draftsman, The Jeffrey Manufacturing Co., Columbus

LADKIN, WILLIAM T., Mechanical Draftsman, Columbus Ry. Power & Light Co., Columbus

PARTRIDGE, MERTON E., Mechanical Engineer, Goodyear Tire & Rubber Co., Akron

SCHULTZ, JOHN A., JR., Assistant Manager, Doehler Die Casting Co., Toledo

SIELAFF, MAX J., Manager, The Loomis Sielaff Co., Cleveland

VAN TINE, CHARLES H., Engineer, The DeVore Co., Toledo

WILLARD, WILLIAM C., Professor of Industrial Engineering, University of Cincinnati, Cincinnati

WOOD, HARRY L., Mechanical Engineer, Geo. T. Trundle Co., Cleveland

YEAGER, LEO R., Assistant Engineer, Jeffrey Manufacturing Co., Columbus

Oregon

SHAW, WILLIAM C., Chief Marine Engineer, Northwest Bridge & Iron Co., Portland

Pennsylvania

BENTLEY, ASA, Draftsman, Westinghouse Electric & Manufacturing Co., East Pittsburgh

BISSELL, ROBERT W., Engineer, Vegetable Oil Products Co., Pittsburgh

DECHANT, FREDERICK H., Consulting Engineer, W. H. Dechant & Sons, Reading

EATON, BERNARD L., Erecting Engineer, William Cramp & Sons Ship & Engine Building Co., Philadelphia

HARLEY, EDWARD J., JR., Designer, Baldwin Locomotive Works, Philadelphia

HARTMAN, JOHN M., Mechanical Engineer, Aluminum Company of America, New Kensington

HAYES, WILLIAM M., Lead Draftsman, Frankford Arsenal, Philadelphia

HURST, EDWARD V., Engineer, U. S. Shipping Board, Emergency Fleet Corp., Philadelphia

JOHNSON, HJALMAR E., Sales Engineer, Laclede-Christy Co., Pittsburgh

MURPHY, EDMUND J. A., Navigator, U.S.S. *Frederick*, Philadelphia

PERROT, EMILE G., Member of Firm, Ballinger & Perrot, Philadelphia

REICHENBACH, HARRY A., Engineer, Fuller Engineering Co., Allentown

RATHMELL, JOHN M., Assistant to Manager, Chicago Pneumatic Tool Co., Franklin

ROBERTS, FRANK C., JR., Estimator, Philadelphia Roll & Machine Co., Philadelphia

STALKNECHT, WARD, Power Engineer, Erie Forge & Steel Co., Erie

SUNDAY, JOHN L., Designer, Philadelphia Electric Co., Philadelphia

TYSON, GEORGE T., Foreman, Barrett Adding Machine Co., Philadelphia

WARWICK, GEORGE W., Engineer of Tests, Armstrong Cork & Insulation Co., Beaver Falls

Tennessee

AYRES, HANES E., Student, University of Tennessee, Knoxville

FULSON, HIRAM O., Chief Draftsman, Union Seed & Fertilizer Co., Memphis

Texas

McDONALD, WILLIAM A., Superintendent of Power, Houston Lighting & Power Co., Houston

Virginia

NORTON, ANSEL M., Lieutenant (jg.) U. S. Navy Flying Corps, Hampton Roads

Washington

ARKILLS, MURWIN E., Engineer of Tests, Pacific Coast Steel Co., Seattle

Wisconsin

ANDERSON, JOHN, Chief Engineer, The Milwaukee Electric Railway & Light Co., Milwaukee

ANDREWS, EDWARD V., Sales Engineer, Nordberg Manufacturing Co., Milwaukee

BRADLEY, HARRY E., Vice-President & General Manager, Allen-Bradley Co., Milwaukee

GATES, LEROY G., Sales Engineer, Nordberg Manufacturing Co., Milwaukee

GREULICH, O., President, Electric Welding & Manufacturing Co., Milwaukee

JACOBSON, HENRY, Works Manager, Logeman Brothers Co., Milwaukee

LOCKE, THOMAS F., Chief Engineer, A. H. Petersen Manufacturing Co., Milwaukee

LOGEMAN, A. G., President, Logeman Brothers, Milwaukee

MANEGOLD, FRANK L., Secretary & Treasurer, Briggs & Stratton Co., Milwaukee

MASEK, JOHN A., Chief Draftsman, The Falk Co., Milwaukee

NORDBERG, BRUNS V. E., General Sales Manager, Nordberg Manufacturing Co., Milwaukee

SCHWANTES, JULIUS A., Assistant Superintendent & Master Mechanic, The Palmolive Co., Milwaukee

STECK, FRED, Service Engineer, Kempsmith Manufacturing Co., Milwaukee

TAUTZ, HERBERT, Tool Designer, Briggs & Stratton Co., Milwaukee

Canada

BOLAND, ROY O., Plant Draftsman, Northern Aluminum Co., Shawinigan Falls, P.Q.

FREY, FRANK, JR., Canadian Kodak Co., Ltd., Toronto

RUMGAY, JAMES A., Partner, Henry Engineering Co., Toronto, Ontario

WARNER, JOHN E. A., Assistant Engineer, St. Maurice Paper Co., Ltd., Cape Madeleine, Quebec

Argentine Republic

KNUDSEN, KNUD, Technical Director, Corporacion Industrial y Financiera, Argentina, Buenos Aires

Chile

DOUGHERTY, HENRY M., Construction Engineer, Chile Exploration Co., Chuquicamata

Cuba

DEQUASIE, GLENN, Mechanical Engineer, Cuba Cane Sugar Corp., Havana

ELLIOTT, LEE M., Assistant to Chief Electrician, Compania Cubana, Ingenio, Jatibonico

England

HETHERINGTON, JOHN, Chief Engineer & Superintendent, Chromatic Film Printers, Ltd., London

Japan

WUNDERLICH, PAUL, Mechanical Engineer, George A. Fuller Co. of the Orient, Tokyo

Philippine Islands

McLAUGHLIN, JOHN, Member of Firm, Clarke & Larkin, Manila

Porto Rico

NORTON, JOHN G., Master Mechanic, South Porto Rico Sugar Co., Ensenada

CHANGE OF GRADING
PROMOTION FROM ASSOCIATE

Wisconsin

ASHMEAD, CHARLES B., District Manager, The Richardson-Phenix Co., Milwaukee

PROMOTION FROM ASSOCIATE-MEMBER

Connecticut

BREITENSTEIN, ALBERT F., Chief Engineer, The Geometric Tool Co., New Haven

Colorado

AKERLOW, GUSTAV W., Plant Engineer, The Gates Rubber Co., Denver

District of Columbia

HOOPER, MARTIN T., Senior Mechanical Engineer, U. S. Public Health Service, Office of Chief Engineer, Washington

Massachusetts

GILMAN, FRANKLIN W., Engineer, Sanford Riley Stoker Co., Worcester

HAMMOND, JOHN H., JR., Owner, Hammond Radio Research Laboratory, Gloucester

MIDDLETON, NATHAN A., Engineer, Hornblower & Weeks, Boston

New Jersey

ANDERSON, RICHARD T., Secretary & Plant Engineer Paterson Parchment Paper Co., Passaic

SERRELL, JOHN J., Partner & Engineer, Smith & Serrell, Newark

New York

McCLINTOCK, ALLAN P., Representative, Locomotive Superheater Co., New York

WILHELM, J. H., Consulting Engineer, J. H. Wilhelm, Inc., New York

Ohio

CALL, ALMON E., Mechanical Engineer, Queen City Coal Co., Cincinnati

Pennsylvania

HOBBS, JAMES C., Assistant Suprintendent of Power Stations, Duquesne Light Co., Pittsburgh

PROMOTION FROM JUNIOR

District of Columbia

OLIPHANT, ABNER C., Engineer, Engineering Council, Washington

Illinois

BOSNIAN, LUTHER H., Engineer, C. P. Berg, Chicago

HIMELBLAU, HENRY, Consulting Engineer, Armour Grain Co., Chicago

New Jersey

WORBOIS, HOMER L., Assistant to President, Spaulding Chain Corp., Bloomfield

New York

STUART, HOMER H., Industrial Engineer, DeLaval Separator Co., Poughkeepsie

WRIGHT, STANLEY, Assistant Eastern Sales Agent, Busch-Sulzer Diesel Engine Co., New York

Pennsylvania

HARRISON, HORACE L., Baldwin Locomotive Works, Philadelphia

SUMMARY

New Applications	205
Applications for Change of Grading:	
Promotion from Associate	1
Promotion from Associate-Member	12
Promotion from Junior	7
Total	225

SUMMARY SHOWING AVERAGE AGE AND POSITIONS OF APPLICANTS ON BALLOT CLOSING JUNE 23, 1920.

Average age of applicants:	
Members	42
Associates	37
Associate-Members	35
Juniors	24
Cadet Engineer	1
Chief Engineers	7
Asst. Chief Engineers	4
Construction Engineer	1
Consulting Engineers	4
Designers	3
Designing Engineer	1
Director	1
Draftsmen	3
Chief Draftsmen	2
Mechanical Draftsmen	2
Engineers	8
Executives (Pres., V.-Pres., Secy., Treas., Mgrs.)	12
Industrial Engineers	2
Inspector	1
Instructors	2
Lieutenant	1
Machine Designer	1
Master Mechanics	3
Mechanical Designer	1
Mechanical Engineers	8
Asst. Mechanical Engineer	1
Chief Mechanical Engineer	1
Plant Engineers	2
Production Engineer	1
Professor	1
Associate Professor	1
Safety Engineer	1
Sales Engineer	1
Asst. Sales Manager	1
Superintendents	6
Asst. Superintendents	2
Mechanical Superintendent	1
Supervising Engineer	1
Supervisor	1
Testing Engineers	2
Works Engineers	3
Works Manager	1
Miscellaneous	46

In Two Sections—Section Two

Volume 42 Number 8

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

AUGUST 1920

A. S. M. E. Affairs

PUBLISHED MONTHLY BY THE SOCIETY
29 WEST 39TH STREET, NEW YORK, U.S.A.

SOCIETY AFFAIRS

The Secretary's Letter—New Officers to be Balloted On—Honors Conferred on A. S. M. E. Members—Professional Sections—The Engineering Societies Employment Bureau—Personals—Necrology—Employment Bulletin—Candidates for Membership

The Secretary's Letter

The Budget

THIS is the time which most persons think is vacation period in Society affairs. On the contrary, it is the time of greatest anxiety and trial to the officers of the Society and the Finance Committee, because the budget for the fiscal year, commencing October 1, must then be prepared. The first estimates must be made by the Finance Committee in July so that they may be submitted to the several committees of the Society in time for their consideration and comment for resubmission by the Finance Committee to the Council.

Notwithstanding the large sums, relative to other professional Societies, involved in the A. S. M. E. budget, we are pressed this year the most of any, due to the almost prohibitive costs of all publication work.

As the bulk of the Society's activities passes through the channels of the various publications, it can be seen that the cycle for all activities starts and ends with the scale of expenditure permissible for publications.

The Secretary regrets more than can be expressed that so many of the Society's forward movements must necessarily be restricted, for the reason that under even exceptional circumstances the outgo cannot exceed income.

Whereas the Society cannot, or rather ought not, accumulate a large surplus, our financial operations being restricted to converting current income into outgo beneficial to the members, yet good business management requires that we should live *within* our income, maintaining a modest surplus as a "surge tank," to use President Miller's expression, to maintain fundamental activities in years of higher expense, and to inaugurate progressive movements.

With the Society's increasing activities about one-third of the annual gross turnover has been recommended by the Finance Committee as a reasonable working capital or "surge tank." This amount, over $100,000, the Society now has.

The coöperation and patience of all members and committees is begged for the coming year.

Advertising Activities

In this connection, a word as to the part advertising plays in the Society's publications will possibly be helpful.

There has been an impression in some quarters that the Society makes a great profit from the advertising carried in its publications. From what has been said earlier in this letter, it is evident that this is not the case.

All of the income from advertising is appropriated by the Council for the benefit of the members in maintaining the Society's monthly publication Mechanical Engineering with its several departments, including the Engineering Index. As a matter of fact, considerably over $50,000 of the income from dues has to be added to the advertising income to carry all of the Publication Committee's activities.

The advertising income is steadily increasing with the merit and wide distribution of Mechanical Engineering and Condensed Catalogues, but under the present enormously increased printing costs it is not quite adequate to produce Mechanical Engineering with the many valuable features which it contains. If it did, more money would be available for sections work, local and professional, and for professional committees and research.

If all firms could know that the advertising revenue received from them was being used exclusively for maintaining a general technical publication which, in addition to being one of the most profitable of mediums for the manufacturer, due to its selected list of readers, over 16,000, is becoming almost indispensable to engineers, we are confident that an increasing number would feel justified in supporting these activities.

As it is, the Society is grateful to the many representative firms who are thus making possible so worthy a publication as Mechanical Engineering—with its valuable feature the Engineering Index, the most comprehensive in the English language.

Our Broader Work

It is estimated that the United States is $18,000,000,000 behind in its program due to the interruption of normal progress by the war.

The Engineering Societies Building has been chosen as the headquarters for the Senate Committee on Reconstruction and Production. The Senate Committee had other offers, but the dignity of our building and an atmosphere free from political or other interests made it the most desirable for such an activity. It is in keeping with the engineer's participation in public affairs that we should tender our facilities for such purposes.

It was indeed fortunate that the American Society of Civil Engineers had an office which could be spared during the summer, and at the suggestion of the United Engineering Society one of their rooms was put at the disposal of the Senate Committee. The Past-Presidents' room of the American Society of Civil Engineers will be used for hearings.

Representatives of the leading industries and captains of industry, economists and other specialists will immediately commence to assist the Senate Committee in laying out a comprehensive program for the restoration of our country to a normal basis. It is to be hoped that our Society can participate in some phase of the work.

When The Federated American Engineering Societies are in full swing such an activity will be a natural function of this organization.

Of the national societies that have signified their intention of joining the Federated Societies, The American Society of Mechanical Engineers is the first, and of the local societies, the Dallas (Texas) Engineering Club holds a similar honor.

Calvin W. Rice,
Secretary.

New Officers to be Balloted On

Before August 19, the Secretary will mail to every member entitled to vote a ballot stating the names of the candidates for President, three Vice-Presidents, three Managers and Treasurer, which offices fall vacant in December next. The names of the candidates for these offices were published in the July issue of Mechanical Engineering. The voting will close at ten o'clock in the forenoon of September 28. The Tellers will immediately canvass the ballots and certify the results to the Secretary on October 1. The Secretary will immediately announce the successful candidates, and their names will be published in the November issue of Mechanical Engineering. The new officers will be declared elected by the presiding officer on the first day of the Annual Meeting.

The virtue of this new method is that the new officers will be apprised of their election in advance of the administrative year. This will permit of their becoming acquainted officially with Society affairs, and later when they take office they will be enabled to administer the affairs of the Society to better advantage.

Honors Conferred on A.S.M.E. Members

THE following are brief sketches of the lives of five members of The American Society of Mechanical Engineers who have been signally honored by various organizations during recent months. They serve as an illustration of the fact that engineers are actively interested in public affairs and that their services are appreciated and publicly recognized.

Taylor Society Confers Honorary Membership Upon Carl G. Barth

Election to honorary membership in the Taylor Society is an honor that has been conferred upon but three men during the ten years of the Society's history. The third member, announcement of whose election was made by the president of the Society at its Rochester meeting on May 8, is Carl George Lange Barth. The high points of the life of Mr. Barth, who is senior member of the firm of Carl G. Barth & Son, are well described in the following quotation from the announcement of his election.

"Not because of his skill as a consulting engineer, for he is not alone in that competence; not because of his unexcelled mastery of the technique of scientific management, for others share with him such distinction; not because of his unique and lovable personality, for others are lovable and some even uniquely so; not because of the rugged integrity of his character, conspicuous though that be; but because of all of these in combination, and especially because of his application of pure science to the uses of management, do we thus honor ourselves and him.

"As assistant to Mr. Taylor some twenty years ago, he brought to Mr. Taylor's genius as a scientist in management, the aid of his own genius in pure mathematics; to the data of which Mr. Taylor's vision inspired the acquisition, he applied the laws of mathematical logic and compelled a chaos of figures to yield its secret; then with that absolute and therefore practical command of his science, he devised the mechanism of a slide rule and put into its simplest form the answer which chaos had been compelled to give, making it available to the clerk in the planning room and to the foreman in the shop."

Carl G. Barth

William Le Roy Emmet

Henry M. Leland

Spencer Miller

Thomas E. Murray

Edison Medal Presented to W. L. R. Emmet

William Le Roy Emmet, consulting engineer for the General Electric Company, of Schenectady, New York, has been awarded the Edison Medal for inventions and developments of electrical apparatus and prime movers. The Edison gold medal was founded in 1904 by the Edison Medal Association, an organization composed of old associates and friends of Thomas A. Edison, and is awarded annually by a committee of 24 members of the American Institute of Electrical Engineers. The 1919 medal was presented to Mr. Emmet at the annual meeting of the Institute, May 21.

A graduate of the U. S. Naval Academy and an officer in the Navy during the Spanish War, Mr. Emmet was most appropriately chosen as a member of the Naval Consulting Board during the recent war. Here he devoted his time largely to the design and production of propelling machinery for naval vessels and merchant ships.

Mr. Emmet's principal civil employment has been with the Sprague Electric Railway and Motor Company, and the General Electric Company. He has achieved fame as an electrical engineer and as an inventor, and has obtained many patents for inventions in electricity, mechanics, and thermodynamics. His most important electric work has been in the development of the general use of alternating current and in the invention and design of ma-

chinery to further the practical application of alternating current, while his most important mechanical work has been in connection with the development and introduction of the steam turbine.

Mr. Emmet has played an important part in the development of electric lighting, alternating-current distribution, air-blast transformers, oil circuit breakers, cable and generator insulation, steam turbines, electric ship propulsion. His most recent development is the mercury turbine, on which he is now engaged. His achievements have been as a pioneer of new methods rather than as an inventor, and much of his most original and most useful work could not be effectively patented nor perhaps even classified as invention.

Doctor of Engineering Degree Conferred Upon Henry M. Leland

The University of Michigan has recently conferred upon Henry M. Leland the degree of Doctor of Engineering. Mr. Leland, who is now president of the Lincoln Motor Company, has been called the father of Detroit's automobile industry. Going to Detroit thirty years ago, he engaged in the manufacture of the finer kinds of machinery and precision tools. He was also one of the pioneers in the manufacture of gasoline, marine and automobile engines.

In 1902 he, with Wilfred C. Leland and several prominent Detroit business men, founded the Cadillac Automobile Company, of which the Lelands remained the active heads until July, 1917. At that time the great need for aircraft led them to sever their connections with the Cadillac Company and organize the Lincoln Motor Company for the production of Liberty aircraft motors. Within eleven months they had broken all records in the number of motors produced. Since the Lincoln Motor Company finished its Liberty motor contracts for the Government, they have been at work developing a motor car in accordance with some of their newer ideals.

During their affiliation with the motor-car industry the Lelands with their engineers pioneered a number of the more important motor-car developments, among the outstanding of which were the electrical system of starting, lighting and ignition and the eight-cylinder high-speed, high-efficiency V-type engine.

Thomas E. Murray Made Doctor of Science by Villa Nova College

At its commencement exercises on June 9, Villa Nova College, Villa Nova, Pa., conferred the degree of Doctor of Science upon Thomas E. Murray, vice-president of the New York Edison Company and one of the foremost men in the electrical industry today. In addition to his association with The Edison Company, Mr. Murray is president of the Yonkers Electric Light and Power Company and vice-president of the United Electric Light and Power Company. He is a director of The Brooklyn Edison Company, the Electrical Testing Laboratories, and the Manhattan Refrigerating Company; is the founder of the Metropolitan Engineering Company and of Thomas E. Murray, Inc.; and has served in various capacities in practically all of the electrical associations and engineering societies.

Mr. Murray's most noteworthy engineering achievements include the planning of the Waterside Stations of the New York Edison Company, the Sherman Creek and Hell Gate Stations of the United Electric Light and Power Company, the plants of the Brooklyn Edison Company, and the hydroelectric development of the Chattanooga and Tennessee River Power Company. He bears the unique distinction of having installed more power-plant capacity than any other man.

In 1910 The Franklin Institute awarded Mr. Murray the Edward Longstreth Medal for his system of safety devices and protective appliances for interior electric wiring. Altogether Mr. Murray has been granted more than 350 patents, principally for electrical inventions. He received the degree of Doctor of Laws from Georgetown University in 1919 and for his research and productive work during the war he received a citation from the War Department.

Spencer Miller Honored for Services on Naval Consulting Board

The services of Spencer Miller as one of the representatives of The American Society of Mechanical Engineers on the Naval Consulting Board during the war, have been officially recognized by a testimonial of appreciation presented to him recently by the Navy Department. The organization of the Naval Consulting Board in 1915 marked the first time that civilians, representing the public through the national engineering societies, have been called into convention with officers of the Government to discuss problems of the Navy.

Mr. Miller's life has been largely devoted to the design and production of marine apparatus. His first noteworthy connection was with the Link-Belt Company of Chicago, as it was during this time that he designed a number of rope drives and apparatus for handling cargo from steamships, and also a method of equalizing the grip of the ropes on the pulleys of different diameters by varying the angles of the grooves. Since 1886 he has been associated with the Lidgerwood Manufacturing Company, of New York. At the time of his first connection with them the company had just begun to manufacture overhead-cableway systems employing the crude chain-connected fall-rope carriers. Mr. Miller developed an entirely new system known as the button-stop fall-rope carriers, which has been employed in the construction of U. S. fortifications, dams, filtration beds, sewers, open-pit mining, and the Gatun locks of the Panama Canal. He also perfected a system of log skidding by steam in the form of a cableway.

During the Spanish-American War he developed the marine cableway in solution of the problem of coaling at sea. To his credit are also the marine transfer for broadside coaling of ships in harbors and an automatic tension engine which makes it possible to operate a breeches-buoy apparatus between two ships in the heaviest sea.

Professional Sections Are Coming Along

Within the last month there have been five conferences of groups of members working on the Professional Sections, one of them being a meeting of the Special Committee on Professional Sections itself, and the outlook for the new activity is decidedly favorable. A synopsis of the progress of the various sections will be of interest.

Aeronautics. The Organizing Conference is about to be held. 188 members have registered.

Fuels. Following the organization of the Executive Committee and Sub-Committees, the program for the session at the Annual Meeting has been laid out and three speakers have accepted. 472 members are taking part.

Industrial Engineering. Nine hundred and thirty-seven invitations to an Organizing Conference on July 23 were being sent out as MECHANICAL ENGINEERING went to press. The program for the Annual Meeting session is laid out, and the session will be a good one.

Machine Shop Practice. The ticket for the Executive Committee has been selected and is about to be balloted on. 460 members are registered. Papers for the Annual Meeting are coming in.

Ordnance. One hundred and sixty members have registered, and the Organizing Conference will be held in the early fall.

Power. The Executive Committee is being selected and plans for the Annual Meeting are under way. This is a very large section, 843 members having registered.

Railroads. Four hundred members have registered and the Executive Committee has organized and has appointed over 60 members on Standing Committees as follows: *Meetings and Papers:* W. L. Bean, Chairman, G. M. Basford, Vice-Chairman, H. G. Bentley, H. Gardner, T. N. Gilmore, H. S. Hammond, R. D. Hawkins, G. S. Hillyer, A. L. Humphrey, L. J. Silcox, H. H. Vaughan, G. W. Wildin, John Dickson, P. Parke; *Information:* R. V. Wright, Chairman, J. T. Carroll, Vice-Chairman, A. B. Appler, W. A. Austin, G. W. Bacon, H. F. Ball, C. E. Chambers, D. F. Crawford, E. H. Dewson, F. L. DuBosque,

G. L. Fowler, C. S. Knapp, N. C. May, A. E. Ostrander, and G. R. Tuska; *Research:* W. E. Woodard, Chairman, B. B. Milner, Vice-Chairman, L. E. Endsley, J. B. Ennis, L. D. Freeman, L. H. Fry, C. E. Fuller, D. C. Jackson, W. F. Kiesel, H. B. MacFarland, W. O. Moody, J. E. Muhlfeld, J. A. Pilcher, Kenneth Rushton and E. C. Schmidt; *Membership:* Selby Haar, Chairman, A. C. Vauclain, Vice-Chairman, E. D. Campbell, C. C. Cromwell, D. J. Jones, V. L. Jones, R. Kearney, M. F. Kincaid, H. S. Knauer, C. R. Knowles, C. H. Knowlton, G. Lanza, J. M. MacMartin, John P. Neff, R. F. Peters and E. T. Spidy. A secretary of the section has also been selected. Plans for the Annual Meeting sessions will immediately be put under way by the Meetings and Papers Committee.

Textiles. Three papers for the Annual Meeting are under way and 101 members are registered.

Materials Handling. Through the initiative of Mr. Robert M. Gates, 381 members have petitioned the Council for a section on Materials Handling "for the purpose of promoting Mechanical Engineering as applied to the art of mechanical handling of all materials."

Power Transmission. Through the initiative of Mr. R. W. Sellew, 51 members have petitioned for a section on Power Transmission, and the Special Committee on Professional Sections is considering the relation of such a section to the Machine Shop Practice Section.

Organization of Standing Committee. After the majority of the sections have elected their Executive Committees, the Chairmen so elected will constitute the Standing Committee on Professional Sections, which is now provided for in the By-Laws. Then as soon as the Standing Committee begins to function the Special Committee will ask for its discharge. The Standing Committee will have a seat on the Council like the other Standing Committees.

Write to Your Society

The Society is always glad to be the medium for securing for members information upon their technical problems. A large number of inquiries are received, and the staff at headquarters is able, with its knowledge of the personnel of the Society, to refer the inquiries to the proper parties for reply.

Among recent inquiries received were those requesting information regarding training the physically handicapped, manufacture of paper boxes and cartons, equipment for making small taps and dies, manufacturers of brush-making machinery, welding cast and malleable iron, refrigerator to be operated by storage battery, concurrent-countercurrent barometric condensers, drums for shipping chemical materials, standard specifications of materials, pressure of piston rings against cylinder walls, shearing machines for cutting fiber, artificial gas production by gasification of coal, incinerating plants for factory use, mechanical methods of treating woods to harden them.

The Engineering Societies Employment Bureau

The United Engineering Societies Employment Bureau not only puts before applicants a list of positions available, but also puts before employers of engineers a list of capable men available. During the past year a large number of technical men have been served by this "clearing house" for engineering positions. In this age of specialists it is imperative that the proper man be placed in the proper place. This the bureau endeavors to do and it has been very successful because of the system of *accurately selected* men under which it operates. The qualifications of each applicant are indexed according to an elaborate though practical system which contains over 200,000 classifications. At the present time there are many specialized men available and many highly specialized positions open, not only in the United States, but in foreign countries: Brazil, Chile, India, British West Africa and elsewhere.

This organization serves members of the national engineering societies and non-members upon the presentation of a letter of reference or introduction from a member. Its address is: Engineering Societies Building, 29 West 39th Street, New York.

PERSONALS

CHANGES OF POSITION

C. H. Baker has severed his connection with the Public Service Electric Company of Newark and is now affiliated with the Diamond Alkali Company, Painesville, Ohio.

R. H. Wallace has resigned his position as general superintendent of the Savage Arms Corporation of Sharon, Pa., and is now employed as an engineer with the Parish Manufacturing Corporation of Reading, Pa.

Grandon D. Gates, formerly assistant works superintendent of the Celluloid Company, Newark, N. J., is now general manager for the Davis-Watkins Dairymen's Manufacturing Company, Derby, Conn.

Robert R. Neild is now associated with the John Inglis Company, Ltd., of Toronto, and the Nova Scotia Steel and Coal Company, New Glasgow, N. S. He was formerly with the Victoria Machinery Depot Co., Ltd., and the Coughlan Shipyards.

J. S. Green has resigned his position with the Southern Iron and Equipment Company of Atlanta, Ga., and entered the employ of the Canadian Ingersoll-Rand Co., in the Jenckes Plant at Sherbrooke, Quebec.

Charles F. Scribner has resigned his position as vice-president and consulting engineer with the Business Service Corporation of Chicago to become consulting engineer, LaSalle Extension University, Chicago, Ill.

Fred C. Moses, formerly designing engineer, Bethlehem Steel Company, Bethlehem, Pa., is now assistant mechanical engineer with the Aluminum Company of America, Pittsburgh, Pa.

J. W. Brussel is now superintendent of motor plant, Willys Corporation, Elizabeth, N. J. He was formerly factory manager for the Dyneto Electric Corporation, Syracuse, N. Y.

M. H. Roberts has severed his connection as chief engineer with the Air Reduction Company, New York, to accept a similar position with the Franklin Railway Supply Company of New York.

W. E. Anderson and Ward Raymond, formerly chief engineers of Phillipsburg, N. J., with the A. S. Cameron Steam Pump Works and the Ingersoll-Rand Co., respectively, are now associated with the Pennsylvania Pump and Compressor Company, of Easton, Pa., the former as chief engineer and the latter as vice-president.

Lewis E. Keil has resigned his position as chief draftsman for the Texas and Pacific Railway and accepted a similar position in the car department of the United Railways of Havana.

W. Jocelyn Dale, formerly associated with the Elia Sugar Company of New York and Elia, Camaguey, Cuba, will be actively engaged as electrical and mechanical engineer in the construction and operation of the electrification of "Ingenio Cespedes" and will be located at Central Cespedes, Provincia de Camaguey, Cuba.

Daniel M. Bates, formerly Major, U. S. A. and agent for the Lewiston Bleaching and Dye Works, is now vice-president of the Day & Zimmerman, Inc., engineers, Philadelphia, Pa.

J. C. Parmely, who has been connected with the Okmulgee Ice & Light Company of Okmulgee, Okla., is now with The Milwaukee Electric Railway & Light Company.

Wilford L. Stork has resigned his position of foundry superintendent of the Detroit Valve and Fittings Co., Wyandotte, Mich., to accept the position of works manager of McCord and Co., West Pullman, Ill., who make gray iron automobile cylinders, steel truck and railroad castings.

Alfred C. De Lorme, associated with the Splitdorf Electrical Company of Newark, N. J., for five years, has severed his connection with that company and has accepted the position of engineer with the Van Sicklen Speedometer Company, Newark, N. J.

George H. Sharpe, formerly deputy administrative engineer, U. S. Fuel Administration for Connecticut, has been elected vice-president and general manager of the Pierce County Coal Company, whose mines are located at Spiketon, Wash.

Charles G. Barrett, formerly sales engineer, marine department, Fairbanks Morse and Company, New York, has become associated with the Worthington Pump and Machinery Corporation, Blake & Knowles Works, East Cambridge, Mass.

W. H. Friend is now vice-president and general manager of the Burnrite Coal Briquette Engineering Company of New York. Formerly he was chief engineer for the Mashek Engineering Company.

Stanley P. Rockwell has resigned his position as vice-president of Weekes-Hoffman Company, Syracuse, N. Y., to become metallurgist at the Whitney Manufacturing Company, Hartford, Conn.

Charles H. Hazleton, formerly works engineer at the National Carbon Company, Inc., Cleveland, Ohio, has become connected with the Foote-Burt Company, Cleveland, in the capacity of superintendent.

Harold B. Buse is leaving the Geometric Tool Company of New Haven to accept a position as sales engineer with Hill, Clarke & Co., of Boston, as their Connecticut representative.

William Tietze has severed his connections with the Citizens Light, Heat & Power Co., of Canby, Minn., and assumed the position of chief engineer of the B. F. Nelson Mfg. Co., of Minneapolis, Minn.

Cecil B. Clyne has completed construction work for the Campania Minera del Mirasol, S. A., at Cusihiuriachic, Chihuahua, Mexico, and has been appointed superintendent of mill construction for the Moctezuma Copper Company of Nacozari, Sonora, Mexico.

Charles T. Main announces the enlargement of his organization to better prepare for engineering work of all kinds of industries, including textile mills, industrial plants, storage and terminal facilities, water-power and steam-power developments, and the examinations and reports on plants with reference to their value, reorganization or development. F. M. Gunby has been appointed engineering manager and F. B. Cole is associated with Mr. Main as assistant engineer.

William Tietze has severed his connections with the Citizens milling department with the Puget Sound Machinery Depot and has taken charge of a branch office in Portland.

ANNOUNCEMENTS

E. Cecil Poultney has resigned his position with The American Car & Foundry Export Company, New York, N. Y.

Charles U. Carpenter, formerly works manager, Recording & Computing Machines Company, of Dayton, Ohio, is now president and general manager for The National Industrial Engineering Company of Cincinnati, Ohio.

Dr. Alphonse A. Adler, for the past ten years professor in charge of machine and power-plant design at the Polytechnic Institute of Brooklyn, has resigned his position and will devote all his time to his practice as consulting engineer in power and industrial plant engineering, with office in New York City.

Frank L. Platt, formerly retained by the War Department as a specialist on industrial planning projects and late lieutenant in the Engineer Corps, has returned to civil life and has become associated with the firm of Waldron & Van Winkle, consulting engineers, of New York and Boston. Mr. Platt will be in the New York office.

John B. Matthews, formerly engineer, Moore Shipbuilding Company, Oakland, Cal., is now consulting engineer and surveyor, in San Francisco, Cal.

Chester E. Wing, formerly associated in business with Charles M. Setzer, Charlotte, N. C., will open an office in Charlotte for the handling of high grade mechanical equipment.

M. O. Leighton and Major C. T. Chenery, members of the American Society of Civil Engineers, and A. C. Oliphant, associate member of The American Society of Mechanical Engineers and the American Institute of Electrical Engineers, have formed a copartnership under the name of M. O. Leighton & Company with offices in Washington, D. C., for the purpose of engaging in general engineering practice and industrial representation before the Federal departments. Mr. Leighton and Major Chenery will continue for the time being as chairman and secretary of the National Public Works Department Association, while Mr. Leighton and Mr. Oliphant will continue service in the Washington office of Engineering Council pending the displacement of that body by the Federated American Engineering Societies.

Gano Dunn, president of the J. G. White Engineering Corporation of New York, has been chosen second vice-chairman of the National Research Council for the year beginning July 1, 1920.

Lester B. Paterson has resigned his position as planning engineer of the Carrie Gyroscopic Corporation and has accepted a position with The American Locomotive Company, New York.

William C. Briggs, associated with the Shepard Electric Crane & Hoist Co., as sales engineer and New York manager for the past twelve years, has purchased an interest in the Franklin Moore Co., Winsted, Conn., manufacturers of electric hoists, small electric cranes and spur geared chain block, and is vice-president in charge of manufacturing.

Eldred E. Besse, of Lowell, Mass., has become associated with the Hodgman Rubber Co., of Tuckahoe, New York, in the capacity of chief engineer.

L. K. Sillcox, formerly master car builder, C. M. & St. P. Ry., Milwaukee Shops, Wis., has been appointed assistant general superintendent of motive power of that railway, Chicago, Ill.

The item in the July issue of Mechanical Engineering concerning Kenneth B. Miller refers to Kenneth B. Millett.

Dr. Richard Moldenke delivered an address on the Production of Good Castings before the convention of the Southern Metal Trades Association, on June 17, at Atlanta, Ga.

Francis W. Smith has been transferred from the Elizabeth, N. J., to the Boston, Mass., branch of the American Agricultural Chemical Co.

O. C. Thompson has been transferred from the New York to the Rockaway, N. J., branch of the Wirebounds Corporation.

F. P. Fisher, who has been manager of the Gas Division of the Empire Gas and Fuel Company of Bartlesville, Okla., for the last eight years, has resigned his position. Mr. Fisher has contributed much to the development of the natural gas industry. His paper, Establishing a Standard of Measurement for Natural Gas in Large Quantities, is a recognized text on the subject, the principles therein set forth having now become almost universally applied. Mr. Fisher has been connected with several extensive gas interests and associations.

L. L. Willard, general superintendent of the business formerly carried on under the name of W. J. Rainey, is now vice-president of the concern, which has been incorporated and hereafter will be conducted under the name of W. J. Rainey, Inc.

APPOINTMENTS

P. E. Crosier has been appointed superintendent of the Citizens Gas Company of Indianapolis, Ind. He has been serving this company in the capacity of assistant superintendent.

W. S. Finlay, Jr., has been elected a vice-president of the American Water Works and Electric Company. He has resigned his position as superintendent of motive power of the Interborough Rapid Transit Company.

Albert L. Pearson, formerly with the Bureau of Standards, Washington, D. C., is now assistant development expert in electricity, War Department, Education and Recreation Branch, Camp Grant, Ill.

Reginald H. Wood, Engineer Lieutenant, R. N., Chief Engineer, H. M. C. Naval Yard, Esquimalt, B. C., Canada, has been appointed Engineer Manager, H. M. C. Dockyard, Halifax, Nova Scotia.

NECROLOGY

ALLAN S. BIXBY

Allan S. Bixby, general manager of the National Malleable Castings Co., Indianapolis, Ind., died on June 12, 1920. Mr. Bixby was born in Philadelphia, Pa., in 1870. He was graduated from Rose Polytechnic Institute in 1892 and started work with the Ewart Manufacturing Co. of Indianapolis, now one of the branches of the Link-Belt Co. With one or two unimportant interruptions he continued with that company until 1902 when he resigned his position as superintendent to associate himself in a similar capacity with the Indianapolis works of the National Malleable Castings Co.

Mr. Bixby's earlier work was primarily in the design and construction of automatic tools and similar equipment. In later years his attention was diverted toward plant management, industrial relations, etc., in which field he did noteworthy work just before and during the War.

In 1919 he was awarded the degree of M. E. by his Alma Mater on his professional record. He became a member of the Society in 1907. He was also a member of a number of local organizations, including the Indianapolis Chamber of Commerce, to the Industries Committee of which he gave much time and attention.

LOUIS L. BRINSMADE

Louis L. Brinsmade was born in Elmira, N. Y., in 1875. He received his early education abroad. He returned to this country and entered Washington University, from which he was graduated in 1896. The following year he received his M. M. E. from Cornell University. For short periods he was connected with the St. Louis Water Department, the Bell Telephone Co. and Westinghouse, Church, Kerr & Co. He obtained his shop experience with the Missouri Car Railway Co. He then returned to Westinghouse, Church, Kerr & Co. where he was located for about six years in their engineering department. He resigned from this position to take over the management of the sales and construction of the New York office of the Westinghouse Machine Co. He was with this firm as manager of the New York office until 1915, when he entered business for himself in New York City. He died on June 16, 1920.

Mr. Brinsmade became a junior member of the Society in 1897 and was promoted to full membership in 1906. He also belonged to a number of social clubs in the city.

WHITFIELD P. PRESSINGER

WHITFIELD P. PRESSINGER

Whitfield P. Pressinger, vice-president of the Chicago Pneumatic Tool Co. and actively engaged in the pneumatic-tool and allied machinery industry for many years, died on June 10, 1920. Mr. Pressinger was born in New York City in 1871. He was general manager of the Clayton Air Compressor Co. for seven years and became widely known through his numerous activities in connection with his work in that line. He became an associate of the Society in 1903. He was also a member of the Compressed Air Society, the Sons of the Revolution, the Masonic fraternity, and belonged to a number of New York clubs.

JOHN H. NORRIS

John H. Norris, chief engineer of the National Meter Co., Brooklyn, N. Y., died on June 21, 1920. Mr. Norris was born in London, England, in 1857, and received his early education in English schools. Upon his coming to the United States he studied at Cooper Union Institute. He then served an apprenticesship with R. Hoe & Co., New York, from 1872 to 1877. For short periods directly following he worked for the firm of Beckett & McDowell, Arlington, N. J., and with the Pawtucket Manufacturing Co., Pawtucket, R. I. From 1882 to 1887 he was connected with Walter Scott & Co., Plainfield, N. J., having charge of the drawing room, including the design and equipment of a new factory. In 1887 he became associated with the National Meter Co., with which concern he was engaged until the time of his death, a period of thirty-three years. In this connection he was especially well known in the water-works field throughout the country, and was an unquestioned authority on the design and manufacture of water meters.

JOHN H. NORRIS

Mr. Norris was a particularly active member of the Society, which he joined as a junior member in 1891, receiving his full membership in 1905. He was chairman of the New York Section during 1917 and for four years served on the executive committee of the Section. He was also chairman of the excursion committee for the Annual Meeting of the Society in 1918.

Personally Mr. Norris was kindly, quiet and unassuming. Patient and thorough with the many problems of his calling: generous and genial with friends and associates, his memory will long be held in affectionate esteem by all who knew him.

LOUIS J. MONAHAN

Louis J. Monahan, president and general manager of the Universal Motor Co., died on February 3, 1920, from pneumonia following influenza. Mr. Monahan was born on August 9, 1876, in Oshkosh, Wis., and was educated in the home schools. When still very young he developed a remarkable talent for mechanics and inventions and in 1902 became associated with John D. Termaat in a number of inventions. They established the Termaat & Monahan Co. to build experimental models of gas engines. These models proved successful and the company continued under the original management until 1913, when Mr. Termaat and Mr. Monahan retired from active management. In 1914 they established the Universal Motor Company, of which concern Mr. Monahan was president at the time of his death.

Mr. Monahan became a member of the Society in 1912. He also belonged to the American Chemical Society and to the Society of Automotive Engineers.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and a pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

INSTRUCTOR IN MECHANICAL ENGINEERING for machine drawing and simple design, elementary steam engineering, and to work into short machine shop course; assignment of work will depend upon experience. Can use graduate with at least one year engineering experience or older man who has done some teaching. Give particulars, with recent photograph. Location near York. Z-1695.

OPERATING ENGINEERS. Excellent opportunity of learning business and developing quickly into supervisory operative position of trust. Offered to 4 or 5 young engineers to enter employment of well-established company manufacturing basic commodity; good salaries from start; applicants must be willing to enter practical work and demonstrate ability to successfully handle same before securing promotion. Successful experience in handling men and production is desirable. Location New York. Z-1694.

PROFESSORSHIP in steam and gas-engine design in Eastern technical school. Subjects to be handled: steam-engine design, gas-engine design, machine design, boiler design, and truck design. Man of experience to become head of Department required. State experience, salary desired, age and training. Z-1692.

INSTRUCTORSHIP in mechanical engineering needed in technical school in N. Y. State. Subjects to be distributed throughout department. Excellent opening for one desiring to teach or to study further before entering practice. State experience, training and age. Z-1693.

MECHANICAL ENGINEER familiar with iron and steel trade, and with broad knowledge of equipment for railroads and public utilities; capable of making technical investigations and reports for executive board of organization interested in determining investment value of railroad and public-utility securities. Complete, detailed, and chronological statement of education, experience, and other qualifications. State salary expected. Z-1689.

COLLEGE GRADUATE with thorough training in physics and chemistry for routine and research work in physical and mechanical testing of metals. Give references. Z-1686.

PHYSICAL CHEMIST with large corporation, familiar with inorganic analytical methods for metallurgical research work. References required. State salary expected. Location New York. Z-1687.

EXAMINATION will be held in July and August for position of junior engineer and deck officer on field force, and of Computor (mathematician) on office force of U. S. Coast and Geodetic Survey. Fifty vacancies in field force and ten in office force. Applicant must be less than 26 years old and received degree of C. E. or B. S. in civil engineering.

After 6 months of satisfactory service positions lead to commissioned grade of aid, which ranks with second lieutenant in army or ensign in Navy. For further information write to R. L. Faris, Acting Director, Dept. of Commerce, U. S. Coast and Geodetic Survey, Washington, D. C. Z-1674.

ENGINEER to take charge of 750 h.p. power equipment (boilers and engine). Must speak Spanish. Location Cuba. Z-1683.

MASTER MECHANIC to take charge of maintenance of car equipment for New England street railway consisting of 106 miles track and operating 80 cars daily. Must have had similar work and responsibilities. Give full particulars as to experience, references, age, nationality, etc. Location Maine. Z-1684.

ENGINEERS with technical and practical training in mechanical, structural, civil and electrical engineering wanted by progressive industrial concern which operates over dozen plants with main office in Toledo, Ohio. Offer splendid opportunities to first-class men with drafting experience, as duties include both office and field work. In reply state education, experience in full, salary desired, and when available. Location Ohio. Z-1668.

FOREMAN for gray-iron foundry. 8-15 ton output. Location Scranton, Pa. Z-1647.

ENGINEER for research, experimental, testing and developing improvements of our standard lines of brushes, hardwares, novelties, etc. Applicant should have technical education as well as practical mechanical experience. Excellent opportunity for advancement. Location Cleveland. Z-1651.

ENGINEER experienced in water-supply design and construction for work in Malay Peninsula. At least one year's work. Location Orient. Z-1655.

ASSISTANT SUPERINTENDENT, technical graduate with at least two years' shop practice, for long established manufacturing company, making high grade of interchangeable work. Give age, experience, religion and salary expected. Location near New York City. Z-1631.

ASSISTANT OR ASSOCIATE PROFESSOR of steam and gas engineering. Temporary appointment for one year with possibility of being made permanent. Most of time will be spent in teaching thermodynamics but candidate who can also handle courses in commercial engineering will be preferred. Duties commence September 23. Location Wisconsin. Z-1632.

GENERAL ASSISTANT to work manager of large hat manufacturer. Young man 20-30 with practical machine-shop experience and native executive ability. Technical training desirable but not absolutely essential. Good personality, tact, and knowledge of men also required. Recent graduates will be considered. Location Brooklyn, N. Y. Z-1633.

PRODUCTION ENGINEER. Man with good technical knowledge and broad experience in up-to-date factories in quantity production: first-class mechanic, who can devise means and design small tools, dies and jigs and fixtures for producing small steel and brass parts cheaply in large quantities. One who has successfully operated an up-to-date production system. Consideration given only to letters specifying where employed last ten years, position held, name of active head of the company and salary expected. Location Michigan. Z-1637.

ENGINEERS AND DRAFTSMEN on estimating design, construction and installation of heavy and medium machine-shop and foundry work, such as largest hydraulic turbines, etc. Several desirable positions open. Location Canada. Z-1638.

PLANT SUPERINTENDENT for company manufacturing fertilizers. Must be technical graduate, preferably mechanical or chemical engineer with some experience in manufacturing work. Single man preferred. State salary, qualifications, technical training, age, and references. By letter only. Location Newton, N. J. Z-1625.

STRUCTURAL STEEL DRAFTSMAN, familiar with details of mill and office buildings. Position permanent, location Havana. Mention qualifications and salary expected in first letter. Z-1627.

ASSISTANT TO EFFICIENCY ENGINEER to be in direct charge of general testing and investigations on boilers, various types of fuel-burning furnaces and steam-using equipment. Young man with technical education and one or two years' experience in testing of steam boilers preferred. Location Ohio. Z-1606.

MECHANICAL DRAFTSMAN familiar with small mechanical structures and preferably having had some experience with buildings and their equipment. Man with taste for and ability to work into executive position preferred. Location Massachusetts. Z-1611.

SALES ENGINEER. Age 28-35. Preferably engineering graduate. Must have experience in selling to industrial plant engineers and building contractors and in dealing with architects in New York district, preferably in lines similar to valves, plumbing and heating specialties. Location New York. Z-1613.

CHIEF INDUSTRIAL ENGINEER of broad experience wanted for major position on technical staff of important analytical organization in New York City. Must be familiar with various branches of engineering, and have ability to pass judgment on scientific, technical and commercial soundness of industrial and other enterprises whose securities the analytical organization desires to consider in making investment recommendation to its clients. No attention will be paid to communications that do not contain complete, detailed chronological information relative to education, experience, and other qualifications of applicant. Men whose ability is worth less than $10,000 a year need not apply. Z-1661.

SALES ENGINEER speaking Spanish familiar with milling and reduction plant machinery, competent to give advice to possible purchasers, to recommend installations of small reduction plants, with designs of layouts. Location Chili, South America. Z-1640.

SUPERINTENDENT, A-1 man thoroughly practical and experienced in modern methods of manufacture. Require experienced tool designer thoroughly experienced in manufacture of small metal goods. Give age, experience and salary. Location Long Island City. Z-1596.

ESTIMATOR AND SALES ENGINEER for large steam-boiler manufacturer. Location Illinois. Z-1597.

RESIDENT ENGINEER to take complete charge of cotton-mill construction. Must be thoroughly familiar with building construction and design, especially brick and timber, also in installation of motor drives, shafting, etc. Familiarity with South American customs and Spanish language desirable. Should be willing to remain at least a year. Location South America. Z-1598.

INSTRUCTOR to teach either or both electrical or mechanical engineering. Prefer young man with some practical experience or who desires to come to Pacific Coast for personal reasons. Location California. Z-1599.

ENGINEERING DRAFTSMAN specially skilled in design and construction of reinforced concrete for work in oil fields of Mexico on plant reconstruction. Location near coast. Conditions good as can be in foreign country. Must be single, should have knowledge of Spanish and be familiar with outside work if possible. At present work will be designs and estimates; later will be construction. Good chance for advancement. Give full information with references in first letter. Location Mexico. Z-1600.

MECHANICAL ENGINEER: technical graduate, about 30 years of age, with 3 or 4 years actual power-plant operating experience as assistant to engineer in charge of power plants. Should possess some executive ability as work will consist of supervising power-plant operations of twelve of our works, supervising design and layout of new power-plant work and conducting investigations in use of steam, air and water in process work. Location Ohio. Z-1602.

INSTRUCTORS AND ASSISTANT PROFESSOR for mechanical engineering department of large university. Location Illinois. Z-1603.

ENGINEER experienced in designing, installing and burning pulverized fuel (coal). Experienced men only. Z-1586.

INSTRUCTOR to take charge of mechanical drawing, descriptive geometry and elementary machine-design courses. Prefer young unmarried man with some teaching experience. Location Wisconsin. Z-1592.

MASTER MECHANIC for company manufacturing food products. Location Brooklyn, N. Y. Z-1593.

MECHANICAL ENGINEER experienced in passenger and freight-elevator work. Excellent opportunities for future. Location Pacific Coast. Z-1568.

SALESMEN for financial and industrial publicity and research. Remuneration is on commission basis, but returns, due to coöperation, are greater than compensation received by sales engineer. Z-1569.

CHIEF DRAFTSMAN wanted. Experienced in machine designing and mechanical drafting to have charge of drafting room. Must be capable of supplying manufacturing department with accurate working drawings and bills of material for the manufacture of vegetable-oil machinery. Location Georgia. Z-1574.

CHECKER in drafting room of engineering department. Technically trained man, graduate of either civil or mechanical engineering, not electrical. Should have some experience in plant construction; three or four years in responsible position laying out work, checking, etc. Location Bayway, N. J. Z-1575.

CONSTRUCTION ENGINEER for installation of power plant for steel mill in Alabama. Low-pressure turbine generator plant, with pumps, pipe lines, etc. Location Alabama. Z-1576.

INSTRUCTOR to teach railroad work and surveying, recitation, field and drawing-room work. Salary is dependent upon experience. Location Pennsylvania. Z-1579.

MECHANICAL ENGINEER familiar with automatic package and other saving machinery for installation, development and experimental work. Must not be over 40 years old. Location Illinois. Z-1559.

DESIGNER experienced in medium heavy machinery such as elevators, conveyors and crushers for company manufacturing sand-blast machinery. Practical engineer who has worked through shop with designing experience between 35 and 45 years old desired. Location Maryland. Z-1561.

LUBRICATION ENGINEER with executive ability for work in Japan. Man who has lived in Japan preferred. Location Japan. Z-1544.

SALES ENGINEERS (3 or more) preferably with experience along pneumatic tool or kindred line. Location New York City. Z-1549.

MECHANICAL ENGINEER with broad experience in machine design for position of professor in southern university. Location South. Z-1552.

PRODUCTION ENGINEER experienced in steam-heating equipment to organize and develop production of thermostatic valves. Location Pennsylvania. Z-1530.

MANAGER OF SHIPPING AND RECEIVING to take charge of operations, involving large tonnage in connection with railroad, motor-truck and marine shipments in plant covering extensive acreage. Must be thoroughly experienced and able to take entire charge of organizing, planning and carrying out work efficiently. Plant one hour's ride from New York City. Z-1531.

MECHANICAL DRAFTSMEN. Experienced for locomotive design and detail. State technical training, experience and salary. Location Philadelphia, Pa. Z-1468.

ASSISTANT PROFESSOR OF MECHANICAL ENGINEERING, technical graduate to assist in laboratory courses; to take charge of courses in high speed internal-combustion engines and automotive design, which is part of optional course in automotive engineering for seniors in mechanical engineering. Location Michigan. Z-1434.

SALES ENGINEERS. Old-established company producing special steel castings and forgings for mining, milling, quarry and contracting machinery can use several technical graduates as salesmen working for its district offices. Must have ability to sketch machine parts, knowledge of foundry methods and commercial sense. Z-1283.

YOUNG INSTRUCTOR IN MECHANICAL ENGINEERING; good opening for one who desires to go into teaching profession. Location Maryland. Z-1257.

ASSISTANT PROFESSOR OF MECHANICAL ENGINEERING desired in high-grade institution on Pacific Coast. All-around man in both class and laboratory work preferred. Position is available also for instructor in mechanical engineering who can devote his attention to drawing room work. Send complete accounts of experience and qualifications. Z-1241.

GRADUATE MECHANICAL ENGINEERS with automobile experience to work on designing in connection with motor trucks. State in detail experience, salary, etc. Location New York City. Z-1210.

SALES ENGINEER to travel. Must be familiar with valves and jobbing trade. Traveling through South or Pittsburgh. Z-1205.

MECHANICAL ENGINEERING INSTRUCTOR to have charge of machine shop and teach one course in machine-ship practice and one in junior mechanical laboratory. Must be college graduate. Engineer interested in this type of teaching desired. Location Texas. Z-1180.

MARINE ENGINEER, high-grade technical graduate. Experienced in design of all kinds of marine machinery and qualified to make complete calculations and designs of marine machinery. Opportunities for advancement are good. Salary paid commensurate with experience and ability of men selected. Location New Jersey. Z-1158.

MECHANICAL OR ELECTRICAL ENGINEERS, technical graduates or equivalent training. Permanent expansion of business presents opportunities for one or two men with broad experience and several promising men not so far advanced. Openings lead to positions of responsibility with large essential industry in Chicago. Experience along any of following lines desirable:—Planning tools, fixtures and equipment for machine or assembly operations; metal finishing; time study and rate setting; development of special processes and machinery; investigation of materials and correcting shop troubles. Work largely confined to quantity production of small intricate parts on interchangeable basis. Applicants should have some experience in manufacturing products similar to typewriters, adding machines, cash registers magnetos, meters, telephones, phonographs, clocks or sewing machines. Give full particulars about education, experience, age, etc. All applications with above qualifications will be acknowledged promptly. Z-1118-20.

MECHANICAL ENGINEER with experience in designing and selling hoisting and elevating electric and hydraulic machinery and apparatus, as well as in general jobbing work of large foundry and machine shop. Man under forty with technical education preferred. Give full details as to past and present employment, education, salary wanted, age, married or single and date services available. Z-1045.

PRESS-ROOM AND TOOL-ROOM FOREMAN. Shop making medium and small stampings in both light and heavy gage steel. Increasing shop capacity and offer good opportunity for two first-class men. Location Middlewest. Z-1041.

DESIGNING AND OPERATING ENGINEER for industrial gas plants. Must possess executive ability and be capable of heading department. Reply in detail. Location New Jersey. Z-1019.

ENGINEER to study utilization and prevention of waste material in cutting metals. Man engaged in metal stamping would have desired experience. Location New Jersey. Z-486.

ENGINEER for study of polishing methods and equipment. Should have knowledge of abrasives. Mechanical or chemical engineer would be best suited for this work. Location New Jersey. Z-487.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 10th of the month preceding date of issue and should be limited to 45 words. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

MECHANICAL ENGINEER, technical graduate, 33, married; 12 years' experience in design, planning, time study, bonus system, organization of new departments, and equipment for new processes, expert in accurate mass production. Desires connection progressive concern as executive. Location preferred Cleveland. SM-5395.

MARINE TECHNICAL REPRESENTATIVE, at ship and navy yards throughout country for past three years; for firm manufacturing marine equipment; desires connection with firm manufacturing marine engineering apparatus, as district representative. Will go anywhere and travel if necessary. Technical graduate, twenty-eight years of age. SM-5396.

EXECUTIVE MECHANICAL OR SALES ENGINEER. Aged 29. Technical graduate and 12 years' experience in manufacturing. Engineering, production, and inspection of heavy machinery. Especially familiar with locomotive design and manufacture. As army ordnance Captain had under immediate direction approximately 1,000 officers and civilians representing practically all trades and professions. At present doing sales and engineering work in executive capacity. Desire position paying minimum salary of $4,500, offering an opportunity. SM-5397.

MECHANICAL ENGINEER, Purdue graduate; three years' experience highway construction, four years with internal-combustion engines, including high - compression engines of the Hvid type. At present employed in experimental work. Prefer Middle West. Available October 1. SM-5398.

MANAGER FOR SOUTH AMERICAN COUNTRIES, American engineer, technical education, married, several years' experience in Brazil as general manager of large American interests. Know country and speak Portuguese fluently. Connection with American firm desired as manager, general representative or special investigator. Successful executive. Extensive experience in industrial engineering, cost accounting, standardization, purchasing and manufacturing. Was also in American Consular Service. SM-5399.

EXECUTIVE ASSISTANT to general manager or chief engineer of manufacturing concern, holding company or public utility. Experience, two years teaching, three years construction work; three years consulting engineering work for federal and state governments. Can assemble corps of engineers familiar with the Polish, Russian, German and French languages on reasonable notice. Member A. S. M.E. and A.I.E.E. Salary $4,500 to $5,000. SM-5400.

MECHANICAL ENGINEER, graduate 1919. One year drafting-room work, including truck design and tool designing. Also practical machinist. At present employed but desirous of moving to West. Would like to locate in Washington, Oregon or Idaho. Available September 1, if given month's notice. SM-5401.

MECHANICAL ENGINEER, technical graduate; 15 years' experience in operation, testing and design of power plants; open for position with steel company or industrial concern or as superintendent of power or steam engineer. Can furnish best of references. SM-5402.

GENERAL MANAGER. Technically educated. Proven executive and organizer with long successful record in prominent corporation; 20 years' experience in engineering, production and commercial branches of industry. Several years abroad. Can satisfy as to native judgment, tact, and qualifications for management of manufacturing company. Desire connection with progressive company which may lead to interest in business. SM-5403.

MECHANICAL ENGINEER, 25; graduate M.I.T. specialized in steam and combustion engineering, at present in charge of efficiency of stationary power plants totaling 20,000 b.h.p. of large western railroad, desires position offering better opportunities for advancement. Good record, and references. Would consider position with firm of consulting or construction steam engineers, or as steam engineer of manufacturing concern. Opportunity for advancement rather than initial salary chief consideration. SM-5404.

INDUSTRIAL EXECUTIVE with four years' successful record as shop superintendent and production engineer in plant of 3,000 men desires position with good future. Aged 29, graduate mechanical engineer. SM-5405.

PLANT ENGINEER AND MANUFACTURING EXECUTIVE; technical graduate; 15 years' general engineering and contracting experience. At present in entire charge of all construction and maintenance for large tool-manufacturing concern. Thoroughly conversant with shipyard management and vessel repairing. Used to assuming large responsibilities along these and similar lines. Would act as manufacturers' agent. Open for engagement shortly. SM-5406.

CHIEF ENGINEER, head of engineering department, is open for engagement in similar capacity. Good executive and organizer with ability to get results. Wide experience with big concerns. SM-5407.

MECHANICAL ENGINEER; college trained with four years' experience in production-works engineering, machine-tool sales. Desire connection with manufacturer in engineering sales or purchasing work. SM-5408.

CHIEF DRAFTSMAN OR ASSISTANT ENGINEER. Technical graduate in mechanical and civil engineering. Age 31, married. Eight years' experience as detailer, layer-out, checker, chief draftsman and mechanical engineer. Power plants and units, electrical locomotives, electric traveling cranes, airplane equipment and instruments of precision. Not production or industrial expert but high-grade mechanical engineer qualified to supervise designing and drafting departments. SM-5409.

MANUFACTURING EXECUTIVE, wide experience in all lines, desires connection with large enterprise. Minimum salary $5,000. SM-5410.

MANUFACTURING EXECUTIVE; American; 36; ten years' experience in manufacture and finishing of light and heavy-metal stampings. Familiar modern production methods and installation of piece-work and bonus systems. Successful handling of labor. Minimum salary $6,000. SM-5411.

PROFESSOR MECHANICAL ENGINEERING who resigned college appointment to take up engineering for navy during war and who has only recently been released from that duty, seeks connection with first-class university. Best college and engineering references. SM-5412.

EXECUTIVE graduate mechanical and electrical engineer (1911). Broad electrical and mechanical experience, shop work, production and cost accounting. Thoroughly familiar with modern production methods, accounting and scientific management. Ex-army officer. Age 32. Would consider sales. Salary of secondary consideration to opportunity. SM-5413.

EQUIPMENT ENGINEER familiar with manufacture of interchangeable parts, gage design, placing of tolerances, etc., on product similar to fire arms, cash registers, typewriters, etc. Position desired in central New York. SM-5414.

MECHANICAL ENGINEER, 28, married; four years varied experience with large plant manufacturing cotton-seed products. Two years as officer, engineer U. S. A. Desires position with industrial concern, where energy and ambition counts. At present employed. SM-5415.

MECHANICAL ENGINEER, designer, executive, expert on intricate mechanisms, such as adding and calculating machines, labor-saving devices, etc. Also shop tools, and tooling methods, production systems, etc. Am at present in charge of designers. Age 38, available immediately. Location vicinity New York City. Salary $3,500. SM-5416.

SALES ENGINEER, technical graduate, age 23, at present so employed. Seeks bigger opportunity, preferably with firm manufacturing some power-plant specialty. Location New York City or vicinity. Salary $175. SM-5417.

CHIEF OR ASSISTANT CHIEF ENGINEER; 12 years' experience in design and testing of pumping machinery in several of larger plants. Know all phases of business. At present chief engineer but would consider position as assistant in large organization. Age 33, married. SM-5418.

SALES ENGINEER; 35; 10 years' experience in engineering. Also manager Philadelphia territory for Western concern for three years. Desires new connection with good live firm to cover mill and factory trade. SM-5419.

ASSISTANT SUPERINTENDENT. Technical degree 1914. Experienced as assistant construction engineer large power plant. Practical blast furnace experience as fireman large steel plant. Minimum salary $5,000. Age 28, married, references. SM-5420.

MECHANICAL ENGINEER. Technical graduate, desires position in engineering or research department. Two years' experimental work along mechanical lines involving some machine design. Two years' office work in sales department of manufacturing company and one year marine engineering. Salary $2,400. SM-5421.

MECHANICAL AND STRUCTURAL DRAFTSMAN, designer or chief draftsman, technical graduate, six years' practical experience, unmarried, at present employed. Desire location in New York City or vicinity, salary $2,100. Had experience as chief draftsman. SM-5422.

MECHANICAL AND ELECTRICAL ENGINEER. Technical graduate, desires position with consulting engineering firm, or firm anticipating extensions in power system. Thoroughly familiar with steam power-plant lay-out, design and construction. Age 24, single. Salary commensurate with responsibility. SM-5423.

ASSISTANT PROFESSOR of mechanical engineering, with large and varied experience, mainly in machine design and steam engineering; including about two years. Location preferred within 500 miles of New York City. SM-5424.

MECHANICAL ENGINEER. Technical training; 30 years old; married; 10 years' experience on hoisting, conveying, power transmission and coal-handling apparatus, desires permanent connection with reliable and progressive firm as assistant to chief engineer, executive, or in other responsible capacity. SM-5425.

ENGINEERING EXECUTIVE OR GENERAL MANAGER, 37, technical graduate. Ten years as engineer and manager with concern manufacturing engines, turbines and fabricating pipe; one year mechanical partner in architectural office; two and a half years in France, where erected and had complete charge of large army automobile-repair shop. Salary $7,500. Location New York City or vicinity. SM-5426.

MECHANICAL ENGINEER, technical graduate, married, desires to locate permanently as plant engineer or in executive position of similar character. Five years' experience on plant construction and layout; efficiency engineering; machine design; power-house design; operation and installation. Capable of handling new design as well as maintenance work of general character. SM-5427.

SUPERINTENDENT OR WORKS MANAGER; 25 years of technical and practical experience in manufacturing of interchangeable parts in all branches. Competent executive; capable organizer, thoroughly familiar with modern mechanical engineering and production methods; age 46. SM-5428.

TECHNICAL GRADUATE in mechanical engineering, 28, single; three years' automatic machine designing and one year assistant mechanical engineer of large manufacturing concern, desires responsible position with progressive concern. SM-5429.

GENERAL MANAGER, American, 35, broad successful experience construction, organization and effective operation of wide range of industrial plants under practical scientific management methods. Desire permanent connection with progressive concern having difficult production problem or extensive development program. Position must be one having outlet for initiative and one where ability and hard work will be recognized by opportunity to grow in organization. Available immediately. SM-5430.

MECHANICAL ENGINEER, technical college graduate, 33; six years in designing and engineering, punching and shearing machinery, boiler and structural shop machinery. Present employment covers five years. Desire to become associated with firm of consulting or industrial engineers. Chicago and vicinity preferred. SM-5431.

CHIEF ENGINEER, head of engineering department, is open for engagement in similar capacity. Good executive and organizer with ability to get results. Wide experience with large concerns. SM-5432.

MECHANICAL ENGINEER, 37. Fifteen years' experience covering broad field in mechanical lines. Specialized for seven years in heating and ventilating. Past few years devoted to power studies for industrial plants. Desire responsible position with possibilities, preferably Detroit or vicinity. SM-5433.

DESIGNER AND EXECUTIVE desires position growing concern with opportunity to develop into high-grade executive. Eleven years' experience in tool and machine design and minor executive positions in manufacture of typewriters, guns, automobiles and machine tools. Least salary considered $3,000. SM-5434.

INDUSTRIAL PLANT ENGINEER with 16 years' experience as draftsman, chief draftsman, assistant construction engineer on general industrial plants, steel, forging and mining, etc. At present employed. Desires change of executive nature. Pleased to furnish full particulars as to experience and reference. SM-5435.

TECHNICAL GRADUATE, 28, married, five years' experience, desires position with manufacturing concern. Energetic, conscientious, ambitious worker. Talks several languages. Has worked in foreign countries, U. S. and Canada. Will give more consideration to opportunity for experience and advancement than to initial salary. SM-5436.

MECHANICAL ENGINEER. Member A.S.M.E., technically educated and trained, over 20 years' experience in consulting, constructing and executive capacities in various branches of engineering work. Recently released, three years in U. S. Air Service with rank of Major, experienced in internal-combustion engines and airplane construction. Desires responsible position with reliable concern. Preferably on Pacific Coast but location immaterial if position satisfactory. SM-5437.

MECHANICAL ENGINEER with 20 years' manufacturing experience, desires new connection as general or factory manager with progressive enterprising concern, having possibilities for future expansion. Past experience as general manager, factory manager, superintendent and chief engineer has been acquired in manufacture of airplanes, automobiles, trucks, gas engines, tools and special equipment. Thoroughly familiar with accurate interchangeable production in above lines, and up to date on cost accounting. Member A.S.M.E. 41, married. Can show successful record. Best of references as to executive ability and character. SM-5438.

WORKS OR PRODUCTION MANAGER, 15 years' broad, practical experience in manufacturing production control, engineering, purchasing and cost accounting; gasoline engine, metal and wood-working lines; able executive and organizer with initiative; technical graduate; aged 37; married. At present employed by large corporation. SM-5439.

MECHANICAL ENGINEER, 30, married; six years' experience on design of tools and special machinery. Four years' experience as process engineer, chief draftsman and assistant chief engineer. At present in charge of engineering department in Boston, on experimental work. Any location, but prefer East. Excellent references. SM-5440.

MECHANICAL ENGINEER, 30, married; having purchasing and general manufacturing experience with large electrical manufacturer, desires engagement vicinity New York. Well acquainted New York market. Would consider entering foreign field as representative. Working knowledge. French, Spanish and German. SM-5441.

EXECUTIVE ENGINEER, mechanical and structural, 17 years' experience, American, 36, married. Broad experience industrial-building design and equipment design and installation. Expert in piping layouts. Special chemical plant experience. Thoroughly familiar with gage work and interchangeability, quantity production, tool design, general mechanics; salary $5,200-6,000. SM-5442.

MECHANICAL ENGINEER desires position with consulting engineer. Five years' machine-shop work, three years' plant engineer, one year design. Graduate of M. I. T. Married, 31 years of age; available September 1. Salary $4,000. SM-5443.

EXECUTIVE ENGINEER, age 33, eleven years' manufacturing and business experience in iron and steel products and sales, desires connection in New York district. Possesses character and personality required to meet men of high standing. Qualified to handle financial and administrative work. Under suitable conditions would be willing to acquire interest in going engineering or manufacturing organization capable of growth and development. SM-5444.

SPECIALIST IN TRANSFERENCE ENGINEERING, member, wants to arrange with organization having ample facilities for manufacure and sale of recently patented appliance for which there is a ready and profitable market. Services optional. SM-5445.

MECHANICAL ENGINEER, technical education, age 24, with five years' practical experience covering machine-design, power-transmission and plant-maintenance engineering. Energy, initiative and personality. Desires position as assistant engineer on industrial work or with responsible engineering concern. Location New York City or vicinity preferred. Salary $2,400. SM-5446.

WORKS OR PLANT ENGINEER, chief engineer or chief draftsman. Experience covers installation and construction, design of medium to heavy machinery, and shop work. In responsible charge of work and men for number of years. Age 37. SM-5447.

SUPERINTENDENT OR MANAGER, technically-trained engineer in addition to being practical mechanic, with 20 years' varied experience in essential and special branches; exceptional ability for getting best results from men and equipment, develop methods and processes for quality, quantity and low cost in established concern or working out new enterprises. Principals only. SM-5448.

INDUSTRIAL ENGINEER, mechanical rubber, age 28, married, M.I.T. One year electrician, machinist, machine designer; two years as mechanical engineer on maintenance and new designs; two years as industrial engineer on time study, analysis and improvement of process, factory layouts, standardization, costs, organizations. New England. SM-5450.

INDUSTRIAL ENGINEER, technical graduate, age 31, with eight years' practical experience, design and layout of power plants, industrial plants, heavy machinery, etc.; also time studies, planning, scheduling and routing production, cost accounting, stores control, etc., with present firm three years; good reason for desiring change, would consider position as sales engineer at present located in New York City. SM-5451.

MARINE AND MECHANICAL ENGINEER, experienced in construction, installation, operation and maintenance of marine boilers and machinery, with knowledge of power-plant and mining machinery. Two years chief inspector of machinery Emergency Fleet Corporation; member A.S.M.E. Soc. Naval Arch. and Marine Engineers, Assoc. Soc. Naval Engineers. Age 34, married; no travelling, but will locate any place. SM-5452.

MECHANICAL ENGINEER avaiable. College graduate, 31 years old. Five years' experience with large railroad on production, research work, railroad equipment; two years' experience with Engineer Corps in production branch; desires to locate with firm where engineering experience can be used in business offering bright future. SM-5453.

ENGINEER, graduate mechanical, three years marine engineer, three years technical work, etc. Philadelphia or vicinity; 30 years old. SM-5454.

FACTORY MANAGER OR SUPERINTENDENT with 18 years' active manufacturing experience from bench hand to manager. Thoroughly conversant with modern factory methods, as, organization, management, production, costs employment and traffic. Especially fitted for organizing and developing new industry or in building up existing organization that is not showing satisfactory results. Now employed as works manager of plant organized developed from its conception. Can arrange to be available not later than October 1. Age 39, and in perfect health. SM-5455.

ASSISTANT TO BUSY EXECUTIVE, technical graduate, age 28, single; two years' machine shop; two years' mill engineering and management; two years Army Ordnance officer; one year machine design and development; desires to make new connection presenting real opportunities for development. SM-5456.

ENGINEER with 12 years' varied experience in operation management and sales is open for engagement. SM-5457.

MANAGER, age 35, having unusually broad experience, both here and abroad covering both mechanical and civil engineering, graduate in law and engineering, for four years full charge of machinery company, available shortly. Prefer permanent connection with small company capable of large expansion. SM-5458.

ELECTRICAL ENGINEER, age 29 years. Six years' experience in electrical and mechanical fields as production and sales engineer and as assistant to consultant engineer. Desires permanent connection as assistant to chief engineer of company manufacturing mechanical or electrical devices. SM-5459.

MANAGER—FACTORY OR EXPORT; Graduate electrical engineer, Assoc. Mem. A. S. M. E.; married; 10 years superintendent and part owner of factory in Eastern Pa.; more than 3 years' experience in special purchasing, initiating business, shipping, and following up of production for one of largest export and import houses in America. In this connection traveled and did business extensively in Far East, including Eastern Siberia, Manchuria, China and Japan. Have successfully handled men. Desire position with responsible manufacturing or exporting concern. Location immaterial. SM-5460.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER AUG. 17, 1920

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 200.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by Aug. 17, 1920, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

DAVIS, CHARLES C., Construction Superintendent, American Cast Iron Pipe Co., Birmingham

Arizona

SCHUETTLER, EDMUND H., Mechanical Designer, Inspiration Consolidated Copper Co., Inspiration

California

BUZZO, JOSEPH T., Draftsman, California & Hawaiian Sugar Refining Co., Crockett

HACK, GEORGE D., Draftsman, California & Hawaiian Sugar Refining Co., Crockett

Connecticut

ALVORD, ROBERT W., Assistant in Charge of Estimating, Pratt & Cady Co., Inc., Hartford

BULLARD, STANLEY H., Vice President, Bullard Machine Tool Co., Bridgeport

CRAMPTON, DONALD K., Metallurgist, Chase Metal Works, Waterbury

COLDWELL, EVERETT S., Mechanical Engineer, Columbia Graphophone Manufacturing Co., Bridgeport

CROSBY, RALPH J. Mechanical Engineer, The Asa A. Cook Co., Hartford

HUBBARD, LOUIS DEK., Vice President, Sidney Blumenthal & Co., Inc., Shelton

MARSH, ARTHUR L., Patent Attorney, Singer Manufacturing Co., Bridgeport

McMEEKIN, BOWMAN M., Plant Engineer, Sidney Blumenthal & Co., Inc., Shelton

ROBSON, JOHN, Chief Engineer, Waterbury Tool Co., Waterbury

STETSON, GEORGE A., Assistant Professor Mechanical Engineering, Yale University, New Haven

Delaware

LAROSCH, JOHN P., Chief Draftsman, Edge Moor Iron Co., Edge Moor

District of Columbia

ABBOT, LOUIS A., Captain, Artillery Division, Ordnance Department, War Department, Washington

BALLOU, WILLARD A., Education Expert, Army Vocational Training School, U. S. Army, Washington

HOUSTON, PAUL L., Assistant Physicist and Assistant Chief of Paper Section, U. S. Bureau of Standards, Washington

Florida

ELLIS, EBENEZER D., Manager and Treasurer, Florida Ice & Power Co., Lake Wales

Georgia

MAGRAW, LESTER A., Treasurer and General Manager, Macon Railway & Light Co., Macon

Illinois

BAYLESS, HARRY C., Consulting Engineer, Chicago

BROWN, LOUIS P., Chief Inspector, Oxweld Acetylene Co., Chicago

GROSS, DEWITT C., Structural Engineer and Designer, Armour Grain Co., Chicago

HALL, LEE, Member of Staff, Griffenhagen & Associates, Ltd., Chicago

HENDRICKSON, GEORGE S., Sales Engineer, Republic Flow Meters Co., Chicago

LARDNER, JAMES F., JR., Mechanical Engineer, John Deere Plow Works, Moline

McAULEY, BENJAMIN F., Sales Engineer, Republic Flow Meter Co., Chicago

McDONALD, JAMES E., Chief Engineer, The Edward Valve & Manufacturing Co., Chicago

WHITE, RAYMOND E., Production Engineer, The Page Co., Chicago

Indiana

MURRAY, GILBERT H., Factory Manager, Midwest Engine Co., Anderson

SMECKEL, ERIC F., Assistant Chief Engineer, Edward Valve & Manufacturing Co., East Chicago

Iowa

CROSTHWAIT, DAVID N., JR., Research Engineer, C. A. Dunham Co., Marshalltown

Kansas

SCALLY, ROBERT A., Engineer, Empire Gas & Fuel Co., El Dorado

Louisiana

BOND, WILLIAM H., Mechanical Engineer, The Foundation Co., New Orleans

HAMMETT, GEORGE R., Sales Engineer, A. M. Lockett Co., Ltd., New Orleans

RAYNER, LESTER H., Manager and Chief Engineer, John H. Murphy Iron Works, New Orleans

TRICHE, ANDREW, JR., Assistant Engineer, St. Gabriel Sugar Co., St. Gabriel

Maryland

SENNER, ARTHUR H., Mechanical Laboratorian, N. S. Naval Experimental Station, U. S. Naval Academy, Annapolis

Massachusetts

ACKERMAN, GUY O., JR., Equipment Engineer, Royal Worcester Corset Co., Worcester

ALLEN, HAROLD A., Manager, Burmus Paper Co., Inc., West Dudley

BRADLEY, FRANK L., Designer, Lockwood, Greene Co., Boston

BROWN, GEORGE L., Student, Massachusetts Institute of Technology, Cambridge

CATE, MALCOM S., Machine Designer, Hood Rubber Co., Watertown

CHRISTMAS, JOHN K., First Lieutenant, Coast Artillery Corps, Regular Army, Boston

COONS, WILLIAM E., JR., Chief Inspector, Gilbert & Barker Manufacturing Co., Springfield

DENLEY, ALFRED N., Mechanical & Industrial Engineering, C. T. Main, Boston

DES NARAIS, GEORGE F., Boston

DEWEY, WILLIAM F., Mechanical Engineer, B. D. Rising Paper Co., Housatonic

FORREST, WILLIAM H., Factory Manager, Motor Specialties Co., Waltham

HALL, MALCOM B., Chief Engineer, The Foxboro Co., Inc., Foxboro

HUNTER, WILLIAM, Designer, Norton Co., Worcester

JONES, ROBERT M., Mechanical Draftsman, Saco-Lowell Shops, Newton, Upper Falls

MERRITT, RALPH N. S., Laboratory Assistant, Nordyke & Marmon Co., Worcester

PRESBY, LEROY Q., Superintendent, American Stay Co., East Boston

PRIEST, WALTER F., Draftsman, Ashton Valve Co., Cambridge

THORUP, SIDNEY E., Power Plant Designer, C. T. Main, Boston

WELLS, ARTHUR K., Resident Engineer, The Thompson Lichtner Co., Boston

Michigan

ALDRICH, CLARENCE E., Division Superintendent of Erection, Diamond Power Specialty Co., Detroit

FELIX, FRANK C., Chief Draftsman, Timken-Detroit Axle Co., Detroit

GOODELL, RALPH A., Fire Insurance Engineer, Dyer-Jenison Barry Co., Lansing

HEISTERMAN, GEORGE C., Assistant Production Manager, Lansing Forge Co., Lansing

KIRBY, EDWARD R., Sales Engineer, The Hale-Stephan Co., Detroit

WITCHGER, EUGENE J., Chief Engineer, The Lufkin Rule Co., Saginaw

Minnesota

SMITH, LLOYD L., Sales Manager, Under-Feed Stocker Co., of America, Minneapolis

Missouri

DEAN, EDWARD, General Superintendent, Century Electric Co., St. Louis

LANGSDORF, ALEXANDER S., Industrial Engineer, Crunden Martin Manufacturing Co., St. Louis

Montana

JUNGHANNS, ERNEST L., Design Engineer, Anaconda Copper Mining Co., Anaconda

New Jersey

AYERS, FRED W., General Superintendent, Klaxon Co., Newark

BOGUSZ, WALTER J., Assistant to Experimental Engineer, Klaxon Co., Newark

BOYNTON, EARL S., Chief Engineer and Production Manager, Slocum, Avram & Slocum Laboratories, Newark

GORMLEY, JOSEPH E., Chief Draftsman and Estimator, Crucible Steel Co. of America, Harrison

HENDERSON, GEORGE A., Plant Superintendent, U. S. Arsenal, Picatinney, Dover

JENSEN, MARTEN, Assistant to Power and Safety Engineer, U. S. Rubber Co., Passaic

JOHNSON, WILLIAM H., Gas Engineer, General Motors Corp., Harrison

KNUDSON, LOUIS R., Assistant Service Engineer, T. A. Edison, Inc., Orange

NAFTALI, ISADORE, Tool Designer, Willys Corporation, Elizabeth

ROBINSON, HUGH A., General Superintendent, Aeromarine Plane & Motor Co., Keyport

VAN VALKENBURGH, HOWARD B., Chief Engineer, L. O. Koven & Bro., Jersey City

New Mexico

WEBER, RALF E., Special Apprentice, A., T. & S. F. Ry., Albuquerque

New York

AIZMAN, FRANCIS M., Department Head, Automatic Straight Air Brake Co., New York

ANDERSON, FRANK T., Division Engineer, Westinghouse Kamp Co., Brooklyn

AUER, JOSEPH L., Foreman of Machine Shop, De La Vergne Machine Co., New York

AUSTIN, CHARLES G., H. W. Johns-Manville Co., New York

BANINGER, JOHN H., Assistant Engineer, Gurney Ball Bearing Co., Jamestown

BEADLE, ROBERT C., Managing Editor, Combustion Engineering Corp., New York

BENFORD, DAVID M., Vice President and General Manager, Benford Auto Products, Inc., Mount Vernon

BOLGER, ROBERT S., Sales Engineer, International Meter Co., New York

CARLSON, HARRY, General Manager, American Galco, Inc., New York

CHRISTIANSEN, GEORGE, Draftsman, Watervliet Arsenal, Watervliet

CONNORS, WILLIAM B., Supervising Engineer, C. E. Knoeppel & Co., Inc., New York

ECKLER, ELMER E., Industrial Engineer, H. L. Gantt Estate, New York

ELDER, JOHN E., Chief Engineer, Hotel Pennsylvania, New York

FINCH, RAYMOND J., Calculating Engineer, American Locomotive Co., Schenectady

FROESCH, CHARLES, Chief Engineer, S. W. Merritt Co., New York

GARBARK, NATHANIEL M., Head Draftsman and Engineer, Otis Elevator Co., New York

HARVEY, THERON F., Materials Inspector, New York, New Haven & Hartford R. R., Schenectady

HAUSHEER, EMIL M., Chief Engineer, Mica Insulator Co., Schenectady

HEIBEL, WALTER E., Eastern District Manager, Wilmarth & Morman Co., New York

HISS, George C., Experimental Engineer, Walter Kidde & Co., Inc., New York
HOUCK, Walter V., Vice President and General Manager, O'Neil Iron Works, Buffalo
HULIHAN, John W., Sales Agent, The Wickes Boiler Co., New York
JAFFE, Harry A., Assistant Superintendent, Steam Division, Westinghouse Electric & Mfg. Co., New York
KELTING, Clarence A., N. Y. Edison Co., New York
KUTSCHER, Louis F., Draughtsman, The Foundation Co., New York
LINKER, John L., Marine Engineer & Boiler Draftsman, Newburgh Shipyards, Inc., Newburgh
McDERMOTT, James, Assistant Superintendent, Morse Dry Dock Co., Brooklyn
MELLEN, Winthrop W., Chief Engineer, Atlantic Gulf Oil Corp., New York
MILLER, William A., Draftsman, U. S. Hame Co., Buffalo
PALMER, Henry O., Vice-President and General Manager, Empire Gas & Electric Co., Geneva
PARIS, James, Exporter and Partner, Commercial Engineering Co., New York
PARK, Robert E., Jr., Sales Engineer, Weber Subterranean Pump Co., New York
PEYSER, Joseph, President and General Manager, Peyser Hansen Machine Co., Mount Vernon
PLACE, Louis V. Jr., Czarnikow-Rionda Co., New York
PORTER, Harry W., Manager Insulation Department, H. W. Johns Manville Co., New York
RUBIN, Robert, Assistant Engineer, Otis Elevator Co., New York
SAUNDERS, Albert, Head of Engineering Department, Zinsser & Co., Hastings-on-Hudson
SCHWEIZER, Charles L., Draftsman, West India Sugar Finance Co., New York
STERN, Benjamin J., Tool Designer, Service Engineering Co., Inc., New York
STRACHAN, John, Manager, Marine Department, International Products Co., New York
SWENSON, Frank J., Sales Engineers, Alberger Pump & Condenser Co., New York
TICE, Harold H., Efficiency Engineer, The Emerson Engineers, New York
TROST, Paul A., Foreman, Geo. F. Hardy, New York
WALTERS, Vincent, Experimentalist and Model Maker, Peirce Accounting Machine Co., Inc., New York
WALTHER, Paul H., President, American Chimney Corp., New York
WELLS, Warren M., Fire Prevention Engineer, Pacific Fire Insurance Co., New York

Ohio

CARROLL, William M., President, The Carroll Engineering Co., Dayton
COLLINS, George A., Engineer, Shields Cutter Co., Cleveland
DAY, George E., Engineer, Wellman Seaver Morgan Co., Cleveland
DETRAZ, Edwards W., Testing Engineer, Cincinnati Milling Machine Co., Cincinnati
FABE, Isadore, Tool Designer, Cincinnati Milling Machine Co., Cincinnati
FASSETT, Francis H., Designer, F. K. Fassett, Dayton
HOBSTETTER, Norman A., Salesman, J. C. Lathrop, Cincinnati
HOWELL, John H., Assistant Mechanical Engineer, National Cash Register Co., Dayton
KELLOGG, Robert H., Assistant Plant Engineer, Proctor & Gamble Co., Ivorydale, Cincinnati
MASTENBROOK, H. J., Consulting Engineer, The Ohio Blower Co., Cleveland
MILLER, William R., Mechanical Draftsman, Hooven-Owens-Rentschler Co., Hamilton
MORGAN, Alexander W., General Superintendent, Lorain County Electric Co., Elyria
NAVILLE, Constantin, Engineer, Hooven-Owens-Rentschler Co., Hamilton
PETTIBONE, Charles E., Director of Safety and Welfare, Pickands-Mather Co., Lakewood
PROBST, George H., Mechanical Engineer, Smith Gas Engineering Co., Dayton
ROE, Walter H., Mechanical Consulting Engineer, Tiffin
SCHIRMER, James O., President, The Schirmer Co., Cleveland
SEYLER, George A., Works Manager, The Lunkenheimer Co., Cincinnati
STEPHEN, Walter G., Vice President, The Hale-Stephen Co., Cleveland
WARDWELL, Stanley H., Vice President and Production Manager, Wardwell Manufacturing Co., Cleveland

Oklahoma

WYANT, Lynton D., District Sales Manager, Harvey Crude Oil Co., Tulsa

Oregon

OEHMEN, Ernest L., President, Northwest Engineering Corp., Portland

Pennsylvania

DE HUFF, Henry, Vice President D'Olier Centrifugal Pump & Machine Co., Philadelphia
FONDA, George T., General Supervisor, Bethlehem Steel Co., Bethlehem
GIBBS, Alfred W., Chief Mechanical Engineer, Pennsylvania System, Philadelphia
GOETZ, Harold E., Draftsman, Skinner Engine Co., Erie
HAGAMAN, W. Chadwick, Draftsman, Bethlehem Steel Co., Bethlehem
IBACH, Emil, Tool Engineer, Bethlehem Steel Co., Bethlehem
KILLE, Gildon E., Sales Engineer, Green Fuel Economizer Co., Philadelphia
LINDSLEY, Allen M., Engineer, Alvord Reamer & Tool Co., Millersburg
LONG, David R., Chief Engineer, Armstrong Cork Co., Lancaster
PARK, Stark O., Mechanical and Structural Draftsman, American Steel & Wire Co., Braddock
SPELLER, Frank N., Metallurgical Engineer, National Tube Co., Pittsburgh
TODD, William A., Works Engineer, Treadwell Engineering Co., Easton

Rhode Island

HIDDEN, Charles P., Patent Lawyer, Providence
INGALLS, Elroy D., Engineer, Cameron & Ingalls Engineering Co., Inc., Providence

South Carolina

GAYLE, Walter W., Manager, Saco-Lowell Shops, Greenville

Tennessee

HIDDLESON, William A., General Manager, Bristol Gas & Electric Co., Bristol
STEPPENSON, Thomas L., Knoxville

Texas

GOGGINS, Eugene F., Engineer, Lucey Manufacturing Co., Houston

Virginia

MURRAY, Robert H., Plant Manager, Tubize Artificial Silk Co. of America, Hopewell

Wisconsin

ALLEN, Ernest C., Designer, Allis Chalmers Manufacturing Co., Milwaukee
ANDEREGG, R. H., Chief Draftsman, The Trane Co., La Crosse
BROWN, Carl G., Construction Engineer, Allis-Chalmers Manufacturing Co., West Allis
CANDEE, Allan H., Mechanical Engineer, The Falk Co., Milwaukee
DOWNEY, Frank E., Vice President & Assistant Manager, Downey Heating & Supply Co., Milwaukee
HUBBARD, Algernon L., Jr., Estimator, Allis-Chalmers Manufacturing Co., Milwaukee
KLEIN, Edward E., Draftsman, Milwaukee Coke & Gas Co., Milwaukee
OCKERLANDER, Harry R., Mechanical Engineer, The Filer & Stowell Co., Milwaukee
STUDLEY, Earl D., Draftsman, Milwaukee Coke & Gas Co., Milwaukee
WILKES, Frederick C. D., Manager, Luce Sugar Cane Harvester Co., Watertown

Canada

KERR, John A., Development Engineer, Dominion Tire Factory, Kitchener, Ontario
MONK, Marvin E., Sales Manager & Engineer, Herbert Morris Crane & Hoist Co., Ltd., Niagara Falls, Ontario
SWIFT, Frank H., Resident Engineer, Powell River Co., Ltd., Powell River, B. C.

Cuba

PARKINSON, George V., Chief Electrical Engineer, Cuba Cane Sugar Corp., Havana

India

THORPE, William A. C., District Locomotive Superintendent, Indian State Railways, Bombay

CHANGE OF GRADING

Promotion From Associate

Pennsylvania

MERRILL, Josiah L., Senior Engineer, U. S. S. Shipping Board, Emergency Fleet Corp., (Reinstatement), Philadelphia

Promotion From Associate-Member

Arizona

BUCHEN, Joseph C., Mechanical Engineer, Miami Copper Co., Miami

California

BURTON, Sylvester E., Sales Engineer, American Pump Co., Los Angeles

Massachusetts

KEABLES, Austin D., Mechanical Engineer, John A. Stevens, Lowell

Michigan

GRASSBY, George A., Jr., Mechanical Engineer, Lockwood, Greene & Co., Detroit

Missouri

SCHAUM, Arthur H., Office Manager, Heine Safety Boiler Co., St. Louis

New York

MACDONALD, C. F., Engineer & Ship Surveyor, Lloyds Register of Shipping, New York
STRATTON, David V., President, D. V. Stratton, Inc., New York
TAYLOR, DeWitt McC., Associate Editor, Power, McGraw-Hill Co., Inc., New York

Promotion From Junior

California

BULLEN, Arthur C., General Engineer, Holly Sugar Corp., Huntington Beach

District of Columbia

MASSEY, Mark F., Chief Draftsman, Ammunition Division, Ordnance Officer, War Department, Washington

Indiana

SANDMAN, William F., General Manager, Natco Engineering Co., Indianapolis

Missouri

STEPHENS, Robert R., Sales Engineer, Concord-Wright Machinery & Supply Co., St. Louis

New Jersey

SMITH, Harry R., Mechanical Engineer, Hyatt Bearings Division, General Motors Corp., Harrison

Ohio

JARRETT, Hillard W., The Hagan Corp., Cleveland

Pennsylvania

GUTHRIE, John F., Mechanical Engineer, Abrasive Co., Philadelphia
HULBURT, Wynne D., Assistant Engineer, Maccar Truck Co., Scranton
SCRANNAGE, Lawrence E., Assistant Shop Superintendent, Philadelphia Navy Yard, Philadelphia

West Virginia

FREEMAN, Roger M., Supervising Engineer, Navy Department, U. S. Naval Ordnance Plant, So. Charleston

SUMMARY

New Applications	181
Change of Grading	
Promotion from Associate	1
Promotion from Associate-Member	8
Promotion from Junior	10
Total	200

In Two Sections—Section Two

MECHANICAL ENGINEERING

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A. S. M. E. AFFAIRS

The Secretary's Letter—The 1920 Annual Meeting—Professional Sections Activities—Report of Special Committee on Code of Ethics—Personals—Necrology—Employment Bulletin—Candidates for Membership

The Secretary's Letter

YOUR secretary has been continuously emphazing good citizenship as the fundamental motive for every professional engineer, as well as the fact that the expression of the engineer should be mainly in his contribution of his special talents to the benefit of society, carrying out the full import of the time-honored definition by Tredgold, namely, that "Engineering is the art of directing the great sources of power in Nature for the use and convenience of man."

As a result of his work in the war, the value of the engineer to the welfare of the nation, whether in peace or war, has become impressed upon the mind of the public.

The engineer is now in the position where he must make a concerted effort to live up to this impression in the years of peace by helping solve the great problems of peace.

It is particularly satisfying to see the following spirited foreword by Meredith Nicholson in the June *Cosmopolitan*, which by permission of that magazine we reproduce here.

> America's need for leadership was never greater than now. Not in statecraft alone, but in things spiritual, in education and kindred departments of the social structure, the cry is for men.
>
> "Produce great men; the rest follows," wrote Whitman. This is a large order, not so easily filled. The heavens bestow the consecrating fire warily upon poets, prophets, heroes and lawgivers. The hour and the man do not meet by chance but through the operation of laws we can only believe to be divine.
>
> Nature is constantly experimenting to perfect a combination of elements against a definite need. In the hour of fiery trial, when faith is at the ebb and hope seems a mockery, some confident, cheering voice is sure to ring above the tumult, and the rout is turned to victory.
>
> Always, somewhere, the masterful man is moving forward to keep tryst with Opportunity.
>
> The standard of leadership is highest where thought is freest. Blind partisanship begets weak submission to dangerous or incapable leaders. Leaders may be trained only as we elevate the whole tone of the national life. There is truth in the common saying that we get in America just about the quality of government we deserve. The people of a village who are content with stupid or ignorant rule may not with complacency complain if the affairs of the nation are not managed to their liking. There is no better place for the development of leadership than the small town; and in the important business of improving the conditions of farm life, there is a constant cry for leadership.
>
> It is an error to say that leaders are chosen. Rather it may be said that, responding to some inner prompting and conscious of their power, they arrive.
>
> They step into their destined places with the inevitableness of fate, and the thousands catch step with them and press on joyfully, as to the heartening song of trumpets.

The stress in the above message is in the third paragraph from the end and the last three lines of that paragraph. Urging the citizen in his home town to develop leadership means making sacrifices of his time and energies for the service of his fellow-citizens without the hope of reward or even thanks and followed possibly by much complaint, because such is the path.

Nevertheless, unless the engineer is willing to assume such leadership he cannot attain a place in society, cannot be even regarded as a member of a profession, because in the final analysis the popular conception of a professional man is the same as the conception already formulated by the long-established professions to Medicine and Law, namely, his vocation is essentially a service to others.

The 1920 Annual Meeting

FROM the plans at present in process of preparation for the 1920 Annual Meeting of the Society, to be held in New York, December 7-10, it will be entirely safe to prophesy that it will undoubtedly be the most successful Annual Meeting the Society has ever held.

As the keynote session, the Committee on Meetings and Programs has chosen the subject of transportation and is in search of the biggest men in the country to consider and advance solutions for the problems of railroads, waterways, trucks, and terminals. A master of transportation is being sought to present the entire situation.

The newly formed professional sections are accomplishing much more than was expected of them, and six of them are making plans for very valuable sessions on their subdivisions of Mechanical Engineering. The Professional Sections on Fuels, Management, Machine Shop, Power, Railroads, and Textiles are stimulating the best talent in their consideration of the vital problems of their respective fields, and are arousing enthusiasm in their sessions to be held at the 1920 Annual Meeting.

The need for better engineering in woodworking has been felt by some members of the A.S.M.E. for a considerable time. A sub-committee has therefore been appointed by the Committee on Meetings and Programs to develop a session on this subject for the Annual Meeting. The tentative program forecasts a mighty interesting event. Mr. Thomas D. Perry of Grand Rapids, Mich., is chairman of the committee, and his two collaborators are Messrs. C. E. Paul, of Chicago, Ill., and Grant B. Shipley, of Pittsburgh, Pa.

The interest in Appraisal and Valuation displayed at the 1919 Annual Meeting and the 1920 Spring Meeting will be sustained by a session on this subject. At the St. Louis Meeting the Appraisal and Valuation session voted for the appointment of a committee whose duties would be to study all papers presented before the A.S.M.E. on this subject, to prepare a résumé of the subject-matter given and procure additional papers for a session at the 1920 Annual Meeting. This committee has been appointed, but acceptances have not been returned. It is anticipated that its

work will result in an Annual Meeting session attractive to every engineer interested in this subject.

A number of fine papers have been received by the Society which do not fall under the subdivisions of any of the professional sections. The best of these papers will be presented at general sessions of the Society.

Professional Sections Activities

Power Section Elects Officers

A letter ballot has recently been taken for the purpose of selecting officers of the Power Section, and the following have been elected:

Chairman....................A. D. Bailey
Vice-Chairman....................A. G. Christie
Secretary....................W. B. Gregory
Executive Committee....................C. W. Wilder

Plans for future meetings of the Power Section have not as yet been made, The Executive Committee, however, will convene at an early date and will then plan its Special Committees. Sessions for the Annual Meeting will also be outlined at that time.

Railroad Section Plans Joint Meeting

The Railroad Section in coöperation with the Society's Metropolitan Section and the New York Section of the American Institute of Electrical Engineers will hold a joint meeting on the evening of October 22, 1920. The subject under discussion will be The Relative Advantages of Modern Steam and Electric Locomotives.

Four papers will be presented: two by steam-locomotive designers and two by electric-locomotive designers. The prepared discussion will be by six railroad operating engineers, three specializing in steam-locomotive operation and three in electric-locomotive operation.

The meeting of the Standing Committee on Meetings and Papers of the Railroad Section was held on July 29. W. L. Bean, chairman; G. M. Basford, vice-chairman; H. Gardner, P. N. Gilmore, H. S. Hammond, F. Urban, E. B. Katte, chairman of the E ecutive Committee of the Section, and Roy V. Wright, chairman of the Meetings and Program Committee of the Society, were present. Titles and authors of papers were selected for the Railroad Section Session to be held at the Annual Meeting in December.

The Standing Committees on Research, Information and Membership will be organized within the next month.

Materials Handling Section Holds Preliminary Meeting

On Friday, August 13, the first gathering of the Materials Handling Section was held in the Engineering Societies Building. The meeting was called to order by Robert M. Gates, acting chairman of the Section, who reported that the petition signed by 381 members for the formation of this section had been approved by the Council. Mr. Gates briefly outlined the field of the Section and indicated its great breadth and the variety of problems to be solved. W. N. Dickinson stressed two lines of action for the proposed section: First, to study carefully the entire field and determine the underlying principles of materials handling; second, to systematize the responsibility of handling so that the actual work of handling might be expedited. F. N. Feiker, vice-president, McGraw-Hill Publishing Company, gave a new viewpoint of the subject by sketching the importance of materials handling in every branch of industry. Mr. Feiker also spoke forcefully about the need of coördination of the work of this section with other societies handling similar problems. H. V. Coes, of Ford, Bacon and Davis, spoke of the need of educating the public to the proper consideration and use of materials-handling apparatus as a means of reducing preesnt abnormal costs. Mr. Coes moved that a committee of three, consisting of F. E. Lister, N. J. Penning and H. E. Whitaker, be appointed to nominate the officers of the Section. The meeting was then thrown open to discussion and suggestions and the problems to be solved by the Section were discussed informally and at some length.

The Section plans to get organized as quickly as possible so that it may immediately start its work holding meetings for the discussion of the very important problems in its subdivision. It is anticipated that the Section will assist in the preparation of the keynote session of the Annual Meeting which is to be on the subject of transportation.

Management Section Gets Under Way

"ENGINEERING is the science of controlling the forces and of utilizing the materials of nature for the benefit of man, and the art of organizing and of directing human activities in connection therewith." Such is the definition of engineering as written in the first paragraph of the preamble of the constitution of The Federated American Engineering Societies. It challenges our attention, for it separates the work of engineering into a science and an art, the former dealing with the forces and materials of nature, and the latter with human activities; but both are interwoven and directed toward the great objective, "the benefit of man."

From this enlarging view of the profession of engineering, it is not surprising that more of the members of The American Society of Mechanical Engineers registered for membership in a professional section to be devoted to the "human activities" side of their professional work, than in any other. On July 23 when an organizing conference was held, called together to take steps to form a Professional Section on Industrial Engineering, a total of nine hundred and thirty-seven members had signified their desire to join by registering at the Society's headquarters. The conference was called together by L. P. Alford, member of the special committee on Professional Sections. The members attending voted unanimously to present a petition to the Council for the formation of such a section, but changed the name used in the call to the Management Section. It was believed that the expression "Industrial Engineering" was too narrow to adequately indicate the scope of the work that such a section might and should do.

Under authority of the Council this petition was referred to the Executive Committee and has been voted upon favorably. Its text is as follows:

To the President and Council:

Gentlemen:

Your approval is requested for the formation of a Professional Section to be known as the Management Section, to be inaugurated under the provisions of By-Law B47.

We recommend that this Section be established to organize the members of the Society and others who may wish to affiliate with them, who are interested in the art and science of management.

We recommend further that this Section be authorized to coördinate the activities of those members of the Society who are interested in the development of productive industry.

We recommend still further that this Section be authorized to coöperate with other societies and organizations having similar aims and objects.

We hope also that the Section may be appointed by the Council to be the agency for carrying out the recommendations of the Special Committee on Industrial Engineering as embodied in the report of this Committee now before the Council.

This petition is presented in accordance with the action of the Special Committee on Professional Sections taken at a meeting held on March 11, 1920, and a copy hereof has been sent to that Committee.

This petition is signed by 43 members of the Society, whose names are also on the list of the 937 members who have signified their intention of joining the Management Section when authorized.

Respectfully,

(Signed) L. P. Alford,

Member, Special Committee on Professional Sections, representing Management Section.

In opening this Organizing Conference, Mr. Alford called attention to the interest the Society has always had in the great field of Industrial Engineering and Management. This is evidenced in many ways: in papers in the Society's transactions and

in sessions held at both Annual and Spring meetings; in papers before local sections, especially the New York section; in the appointing last year of a Special Committee on Industrial Engineering and its report, which is now before the Council; and in the resolutions of the Committee on Aims and Organizations, which recommend that Industrial Engineering should be treated as a major subject in the Society's activities. He said that the purpose of the proposed section was to provide definitive organization in this field within the Society, and where possible to coöperate with other agencies having similar aims and objects, such as the Society of Industrial Engineers, The Taylor Society, the Industrial Relations Association of America, and the American Society of Safety Engineers.

In the discussion incident to the adoption of the petition, many comments were offered as to the work that the Section might undertake. It was pointed out that the art of management has no accepted nomenclature and no definition of terms. Thus a starting point in developing coöperation between the various Societies and organizations interested in Management, might be a study of nomenclature and definition, with a purpose of developing those that would be acceptable to the various coöperating bodies, and would come into immediate general use in both the current and permanent literature of Management. Still another suggestion came to the Section from the Research Committee, to the effect that when organized the Section might very properly take up a study of what might be called changes of administration. Two simple illustrations are these: The time cost of washing a window of a given size and under established conditions ought to be the same whether that window is in Boston, New Orleans, San Francisco, or Chicago; and again, the upkeep of leather belting under factory conditions must be capable of determination within narrow limits. These two are typical of a great mass of administrative changes that form a large item of the expense in industry and business. Should the Section be able to determine standards in these changes, they might be laying the basis for lower costs in the operation of industry and the carrying on of business.

Still another suggestion concerned cost accounting and is directed at the thought that the Section might undertake to develop a standard system in industrial and business cost accounting.

F. B. Gilbreth, on behalf of the Committee on Fatigue, of the Society of Industrial Engineers, invited the Section to add one of its members to his Committee, which is undertaking an extensive study of the causes of industrial fatigue and the means whereby it can be eliminated or lessened.

With a knowledge of the fundamentals and practice of management that has been accumulating during the past thirty years, and with the background of the influence that the A. S. M. E. has had through the papers and reports on these matters, there is every reason to believe that the Management Section will be able to undertake the work of major importance. Once a beginning is made to set up standards that will be generally adopted, the foundation will have been laid for a great professional superstructure. It is only when knowledge becomes organized and accepted as true, that it is in a position to be utilized to the best advantage in engineering and industry, so broadly speaking, the immediate task before this Section is to so develop its outline of activity and its committee work, that it will begin to organize the knowledge of management that we already possess for the benefit of the members of the A. S. M. E., as well as for the assistance of those who may be affiliated with the Section, or may be members of organizations that participate in the work. From this viewpoint, it is a program of service for the engineering profession.

To start the work of the Section in motion as rapidly as possible, an Organizing Committee was appointed, consisting of Wallace Clark, Chairman; I. A. Berndt, Carle M. Bigelow, Hugo Diemer and Sanford E. Thompson.

Report of Special Committee on Code of Ethics

ONE of the fundamental requirements of the Society singled out by the Committee on Aims and Organization was a Code of Ethics. We had had one for some years, but the delegates from the Local Sections who constituted the Aims and Organization Committee were not satisfied as to its effectiveness and their unanimous thought was for a revision of the old code, so the following resolution was passed:

Resolved, That it is the sense of this Committee that a short Code of Ethics of broad scope, general in character and positive rather than negative injunction, be prepared and that the same be enforced vigorously; and

That a committee of five on Code of Ethics be nominated by the President and confirmed by the Council who shall report back to the Society.

The Society agreed and the special committee was appointed. After several months of conscientious work, which included an examination of all the codes of all professional bodies in the engineering, architectural, legal and medical fields, the committee brought in the following report which is to be presented to the Society for final action at the Annual Meeting in December next. The Code is also to be referred to the Federated American Engineering Societies.

To the President and Council of The American Society of Mechanical Engineers:

Your Committee appointed on October 24, 1919, to consider a Code of Ethics for The American Society of Mechanical Engineers, submits the following report:

1 A Code of Ethics should be a brief, positive statement of the professional relations of engineers to the public, to their clients or employers, and to one another.

2 The Code of Ethics adopted by A.S.M.E. in 1912 is too lengthy a document, has not been continuously called to the members' attention, and is seldom consulted by them. It has also been strongly criticized for failure to state the engineer's interest in the public welfare. Your Committee recommends that the Code of 1912 be superseded by a briefer and more comprehensive one which can be reprinted at regular intervals in MECHANICAL ENGINEERING and can thus be kept continually before our members.

3 The new Code of Ethics should be common to engineers of every branch of the profession, and also to architects, whose work is closely associated with that of engineers. This universal adoption of such a Code would give it public recognition and support and would thereby make it better known and more binding and effective.

4 Your Committee therefore recommends that the new Code of Ethics be the joint effort of all the professional engineering and architectural societies; and that the Engineering Council or a similar joint professional body be requested to appoint a committee from all the Technical Societies to prepare this new common Code of Ethics, which can then be approved and adopted by The American Society of Mechanical Engineers.

5 If it is not desirable for certain reasons to press at the present time the question of a common Code of Ethics for engineers, your Committee submits the Code of Ethics, attached herewith, for your consideration. If a joint committee is formed, as recommended above, this tentative code may be turned over to such a committee as a starting point for their deliberations.

6 Regarding the administration of any Code of Ethics finally adopted by this Society, your Committee recommends that the President appoint a *Standing Committee on Professional Conduct* after any necessary provision has been made in the Constitution and By-Laws. The duties of this Committee shall be to interpret the Code of Ethics and any cases of questionable ethical conduct on the part of members that may be submitted to them and to report these interpretations to the Council. The Council may approve these interpretations or take such other action as may seem necessary or just. These interpretations should be published when submitted in MECHANICAL ENGINEERING for the guidance of fellow-members of the Society.

This Committee on Professional Conduct should be appointed by the President holding office at the time of the adoption of the Code and should consist of five members, one appointed for five years, one for four years, a third for three years, a fourth for two years, and a fifth for one year. Thereafter, the President then holding office should appoint one member annually to serve for five years and should also fill any vacancies that may occur for unexpired terms. All of these members should be over forty years of age. The Committee after appointment should elect its own Chairman and Secretary. This Committee shall investigate all complaints submitted to it bearing upon the professional conduct of any member and, after a fair opportunity to be heard has been given to the member involved, shall report its findings to the Council of the Society. This report may in some cases suggest certain procedure to the Council.

The Council should have power to act on the recommendation of the Committee on Professional Conduct, either (1) to censure by letter the conduct of the member who has acted contrary to the Code if the breach is of a minor character; (2) to cause the member's name to be stricken from the roll of the A.S.M.E. without a published statement; or (3) to strike the offending member's name from the roll of the A.S.M.E. and to publish in Mechanical Engineering all facts connected with the case and on which this extreme action is based.

Respectfully submitted,

(Signed) Robert Sibley, San Francisco, Cal.
John V. Martenis, Minneapolis, Minn.
H. J. Hinchey, Atlanta, Ga.
Charles T. Main, Boston, Mass.
A. G. Christie, *Chairman*, Baltimore, Md.

February 17, 1920.

PROPOSED CODE OF ETHICS

1 The mechanical engineer should be guided in all his relations by the highest principles of honor, of fidelity to his client, and of loyalty to his country.

2 His first duty is to serve the public with his specialized skill. In promoting the welfare of society as a whole he advances his own best interests, as well as those of the whole engineering profession.

3 He should consider the protection of his client's or employer's interests in professional matters his essential obligation, provided these interests do not conflict with the public welfare.

4 He shall refrain from associating himself or continuing to be associated with any enterprise of questionable or illegitimate character.

5 He can honorably accept compensation, financial or otherwise, from only one interested party unless all parties have agreed to his recompense from other interested parties.

6 He must inform his clients of any business connections, interests or circumstances, such as might influence his judgment or the quality of his services to his clients.

7 He must not receive, directly or indirectly, any royalty, gratuity or commission on any patented article or process used in the work upon which he is retained without the consent of his clients or employers.

8 He should satisfy himself before taking over the work of another consulting engineer that good and sufficient reasons exist for making the change.

9 He must base all reports and expert testimony on facts or upon theories founded only on sound engineering principles and experience.

10 He must not regard as his own any information which is not common knowledge or public property, but which he obtained confidentially from a client or while engaged as an employee. He is, however, justified in using such data or information in his own private practice as forming part of his professional experience.

11 He should do everything in his power to prevent sensational, exaggerated or unwarranted statements about engineering work being made through the public press. First descriptions of new inventions, processes, etc., for publication should be furnished only to the engineering societies or to the technical press.

12 He should not advertise in an undignified, sensational or misleading manner, or offer commissions for professional work, or otherwise improperly solicit it.

13 He should not compete knowingly with a fellow-engineer for employment on the basis of professional charges or attempt to supplant a fellow-engineer after definite steps have been taken toward the other's employment.

14 He should assist all his fellow-engineers by exchange of general information and valuable experience or by instruction through the engineering societies, the schools of applied science, and the technical press.

PERSONALS

CHANGES OF POSITION

Harry de Lapotterie has resigned his position with the Townsend Company of New Brighton, Pa., to become industrial engineer of The Falls Rivet Company of Kent, Ohio.

William D. Cecil has severed his connection as resident material inspector with the Baltimore and Ohio Railroad and is now connected with the Magnus Metal Company of St. Louis, Mo.

Henry C. Berrian, formerly engineer of the engine scientific department, Federal Shipbuilding Company, Kearney, N. J., is now in the engineering department of the Newport News Shipbuilding and Dry Dock Company, Newport News, Va.

Charles Estes Wood, formerly teacher in metallurgy, University of Cincinnati, is now designer and craftsman with The Lunkenheimer Company of Cincinnati.

J. Jacques Stunzi, plant study engineer of the engineering department of the E. I. du Pont de Nemours & Co., has resigned his position and accepted an offer as consulting engineer of the Lancaster Steel Products Corporation, a subsidiary of the General Motors Corporation.

Norris M. Perris, formerly engineer with the Aluminum Castings Co., Cleveland, Ohio, is now industrial engineer of the Industrial Management Council of the Rochester Chamber of Commerce, Rochester, N. Y.

James A. Noxon, formerly with Du Pont Engineering Company, Janesville, Wis., is now superintendent, Rock Cut Stone Co., Syracuse, N. Y.

Ralph W. Shartle has resigned his position as master mechanic with the Wagner Electric Manufacturing Company, with whom he has been connected over five years, and has taken the position of general superintendent with the Wayne Manufacturing Company, St. Louis, Mo., manufacturing washing machines and household appliances.

Charles T. Porter, formerly with the Naval Aircraft Factory, Philadelphia, Pa., is now associated with the Huff, Daland & Co., Ogdensburg, N. Y.

Henry C. Hook, who until recently has been associated with The Aluminum Castings Co., of Detroit, Mich., is now works manager for the Cone Automatic Machine Company, Windsor, Vt.

Herbert H. Van Winkle has resigned his position as chief engineer with The Vogt Bros. Mfg. Co., of Louisville, and is now associated with The John H. McGowan Co., of Cincinnati, Ohio, in the capacity of chief engineer.

Howard Tilson has left the employ of the Celluloid Company and is now in charge of production at the Monroe Calculator Company, Orange, N. J.

Louis A. Delaney, formerly mechanical engineer with F. X. Hooper Co., Glenarm, Md., is now manager of the American Sheet Metal Corporation of Philadelphia, Pa.

Robert G. Guthrie, formerly sales engineer for the Wood Equipment Company, Chicago, Ill., is now with The Widney Test Laboratories of Chicago as director of tests, in charge of important research and testing.

Charles J. Pilliod, formerly with the Pilliod Co. of Swanton, Ohio, is now general manager of the Locomotive Appliance Company of Toledo, Ohio.

George H. Hartman, who until recently was with the Willys-Overland Co., is now connected with the Locomotive Appliance Co. as mechanical engineer, with offices at Toledo, Ohio.

Charles H. Day has severed his connection with the Grasselli Chemical Co. of Cleveland and is now in charge of the Steam Heating Department of the Cleveland Electric Illuminating Co

NECROLOGY

FRED A. SHORT

Fred A. Short, mechanical engineer, Stone & Webster Corporation, Boston, Mass., died suddenly on June 28, 1920, of pneumonia. Mr. Short was born on May 30, 1883, in South Middleboro, Mass., where he received his early education, which was later supplemented by travel and special studies.

Mr. Short started work in 1901 with George Gray, consulting engineer, Providence, R. I., as a draftsman. From 1902 to 1907 he was with Fred S. Hinds, Boston, where he held the position of assistant equipment engineer when he resigned to travel for two years in Europe. There he devoted himself especially to the study of building construction and architetural design, together with cost production and labor. Upon his return to this country Mr. Short became connected with the B. F. Sturtevant Co., Hyde Park, Mass., in the mechanical designing of large apparatus in connection with heating and ventilating for all classes of building. In 1913 he became associated with the Stone & Webster Corporation, Boston, as chief checker. He was advanced through the positions of squad boss and estimator to equipment engineer on power and industrial plants. From 1917 to 1919 he was "loaned" to the engineering division of the Ordnance Department of the Army. In January, 1919, he returned to Stone & Webster as mechanical engineer.

Mr. Short became an associate-member of the Society in 1918.

JAMES H. MANNING

James H. Manning, superintendent of motive power, Delaware & Hudson Co., died in Albany, N. Y., on April 14, 1920. Mr. Manning was born in Cairo, Ill., on February 2, 1862, and was educated in the local schools. He entered the employ of the Union Pacific Railway in 1876 as a machinist's apprentice and was with that road until 1901, when he resigned from his position as division master mechanic to become associated with the Standard Pneumatic Tool Co., San Francisco, Cal. A few years previous to this change, Mr. Manning had invented a piston air drill which received considerable attention throughout the mechanical world. Later he was with the Featherstone Manufacturing Co., Chicago. In 1903 he returned to railroading, becoming assistant superintendent of motive power of the Canadian Pacific Railway, at Winnipeg, Manitoba, and having under his jurisdiction the territory between Winnipeg and the Pacific Coast. The following year he was appointed superintendent of motive power of the Delaware & Hudson Co.

Mr. Manning became a member of the Society in 1917. He was the first president of the Rocky Mountain Railway Club, which was organized at Denver, Colo., in 1900.

LYMAN HAMBRIGHT TREADWAY

Lyman H. Treadway, president of the Peck, Stow & Wilcox Co., Cleveland, Ohio, and Southington, Conn., died on December 7, 1919. Mr. Treadway was born on March 27, 1862, in New Haven, Conn., and was educated in the schools of that city. At the age of eighteen he entered the employ of the Peck, Stow & Wilcox Co. as clerk He was advanced through various positions in mercantile, industrial and financial departments, finally being elected to the presidency of the concern in 1911.

Mr. Treadway became an associate of the Society in 1917. He was president of the Cleveland Chamber of Commerce from 1907 to 1908.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and a pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

DESIGNERS AND DRAFTSMEN familiar with Diesel engines either of the standard or solid injection types. Location New England. Z-1414.

PRODUCTION ENGINEER. Man with good technical knowledge, broad experience in up-to-date factories in quantity production. Must be first-class mechanic who can devise means and design small tools, dies and jigs and fixtures for producing small steel and brass parts cheaply in large quantities. One who has successfully operated an up-to-date production system. Consideration given only to letters specifying where employed last ten years, position held, name of the active head of the company and salary expected. Location Michigan. Z-1637.

MECHANICAL ENGINEER to have charge of several branch houses of engineering firm. Must be familiar with all kinds of machinery. Should have sales and business ability. Must speak Spanish as he will have to consult Spanish engineers. Location South America. Z-1685.

PROFESSORSHIP IN STEAM AND GAS-ENGINE DESIGN in Eastern technical school. Subjects to be handled: steam-engine design, gas-engine design, machine design, boiler design, and truck design. Man of experience to become head of this department required. State experience, salary desired, age and training. Location N. Y. State. Z-1692.

INSTRUCTOR IN MECHANICAL ENGINEERING is needed in technical school in New York State. Subjects to be distributed throughout department. Excellent opening for one desiring to teach or for one desiring further study before entering practice. State experience, training and age. Z-1693.

INSTRUCTOR IN MECHANICAL ENGINEERING, for machine drawing and simple design, elementary steam engineering, and to work into short machine-shop course; assignment of work will depend upon experience. Can use graduate with at least one year of engineering experience or older man who has done some teaching. Give particulars with recent photograph. Location near New York. Z-1695.

ASSISTANT in engineering department of large spring manufacturer. Must be well versed in mathematics, especially the strength of materials. To handle experimental and research work in connection with automobile chassis springs. Location Pennsylvania. Z-1697.

PRODUCTION SUPERINTENDENT for small company manufacturing precision tools; high international reputation; located near Boston. Need to increase production facilities and improve methods. Graduate mechanical engineer preferred, 24 to 30 years of age, with at least year or two of experience with company manufacturing light, accurately-machined products in sufficient quantities to use systematic methods of production. Near Boston. Z-1700.

INSTRUCTOR in Steam and Gas Laboratory, duties to commence Sept. 23rd. Applicant must be a graduate of well-known technical school and should have had some experience in teaching laboratory work. However, men without teaching experience will be considered if other qualifications are satisfactory. Large state university in Middle West. Z-1703.

INSTRUCTORS for large university, in architecture, civil engineering, electrical engineering, mechanical engineering, theoretical and applied mechanics, physics and railway mechanical engineering. Location Middle West. Z-1701.

SALES ENGINEER with experience in sales work and having thorough knowledge of steam power-plant operation. Location Michigan. Z-1705.

SALESMAN with knowledge of Hand and Electrical Cranes. Write full information. Location New York City. Z-1707.

HEAD INSTRUCTOR for course in instrumental drawing and shop sketching, including all drawing and sketching required for courses in civil and mechanical engineering. Applicant should therefore be able to handle shop-drawing, machine design, structural drafting and topographical drawing. Teaching experience desirable, but not absolutely essential. Location New York City. Z-1710.

INSTRUCTOR to fill responsible position in high-grade technical institution in Mass. Subjects, electricity, physics and mathematics. Practical knowledge of electrical installations in textile plants desirable but not necessary. State fully experience, age, salary expected, etc., in first letter. Z-1711.

STRUCTURAL ENGINEER, 28 to 30 years, with thorough experience in design and erection of concrete, steel and wood structures. Permanent position. Location Ohio. Z-1712.

MECHANICAL ENGINEER, about 28 to 30 years of age, by manufacturing corporation, for general mechanical layout and installation work. Permanent position. Ohio. Z-1713.

ASSISTANT MECHANICAL ENGINEERS, technical graduates with 2 or 3 years' practical experience, for assistants to plant engineers in large industrial corporation. Must be a good draftsman. Location Ohio. Z-1714.

SALES EXECUTIVE, high-grade man to promote sales of heavy-duty scales. Must be 30 to 45, and technically educated along lines of mechanical engineering and construction; with ability to write concise, convincing letters. Actual selling experience will be helpful but not so essential as general knowledge of up-to-date factory methods. Good salary will be paid, the amount depending upon qualifications and adaptability of successful applicant. All applications will be considered strictly confidential. Write for appointment for personal interview, stating qualifications. Location Ohio. Z-1716.

AUTOMOBILE-EQUIPMENT ENGINEER. Advanced type of technical training; considerable laboratory experience on starters and ignition systems. Location N. Y. City. Z-1732.

ENGINEER to make boiler machinery and power tests. Also make recommendations as to operation of plant as well as installing new devices and equipments. Knowledge in operation of power plants, as well as practical experience required. Must have tact to make tests and assist superintendent without arousing antagonism. Travelling position. Z-1741.

YOUNG CHEMIST to act as chemist and inspector in foundry, possibly college graduate of this last year who would be accurate enough for analysis of elements of iron and steel. Some experience in metallography would be of advantage. Good opportunity for young

man to expand and make himself useful which will be correspondingly appreciated. Location Ohio. Z-1746.

INSTRUCTOR in engineering drawing. Preferably graduate with some practical experience, who can handle classes in machine drawing and possibly descriptive geometry. Opportunity for outside work. Location Ohio. Z-1747.

ASSISTANT SUPERINTENDENT of engineering shops. Must be a mechanical-engineering graduate, of pleasing personality, executive ability, familiar with modern production methods, and preferably with teaching and practical experience along shop lines. Excellent opportunities for advancement to satisfactory man. Location Texas. Z-1748.

MECHANICAL ENGINEER to handle work along lines of building construction, special machinery, building of new power plant, etc. Location New Jersey. Z-1752.

INSTRUCTOR IN MECHANICAL ENGINEERING. Duties will be in machine design, heat engines, steam engines, etc. Preference will be given men of some experience either in teaching or practice, although experience is not an essential. Location Pennsylvania. Z-1753.

OPERATOR in cement plant. Must have some motor and operating experience in a. c. Good opportunity for right man. Location Montana. Z-1754.

HEAD FOR MECHANICAL ENGINEERING DEPT. Must be technical graduate with successful teaching and practical experience. Give record of education and experience, credentials and late photograph. Location Idaho. Z-1755.

ASSISTANT PROFESSOR OF MECHANICAL ENGINEERING. Location Kansas. Z-1756.

INSTRUCTOR, one who can take entire charge and responsibility, mechanical engineering, gas engines and machine design. Location Texas. Z-1759.

TESTING ENGINEER for oil-refining in New Jersey. Must have had experience in this work. Application by letter only. Location New Jersey. Z-1765.

MECHANICAL ENGINEER to take charge of engineering extension work for University in Middle West; practical as well as teaching experience desirable. Must also have had administrative experience in engineering education. Position will be on par with head of a department. Location Middle West. Z-1766.

INSTRUCTOR with engineering and practical qualifications along manufacturing and design of engines and hydraulic machinery; must be qualified to supervise training of apprentice mechanics and engineers; state age, compensation and synopsis of experience and qualifications; location Massachusetts. Z-1768.

INSTRUCTOR to teach mechanical laboratory and some classroom work in thermodynamics and applied mechanics. Applicant should have one or two years' experience at teaching or practical work. Location Baltimore, Md. Z-1784.

RECENT GRADUATES, M. E. preferred for research and drafting work. Good experience and opportunity. Location Pennsylvania. Z-1786.

INSTRUCTOR in mechanical engineering wanted. Should be particularly fitted to handle courses in machine drawing, and elementary machine design, though he would undoubtedly be used later in other courses, the policy being to distribute sections of required courses among various instructors as they are able to handle them. The position carries with it opportunity for advancement. Location Michigan. Z-1787.

YOUNG ENGINEER, with some experience in building mechanical equipment for handling materials and preferably one who has had some experience in organizing handling gangs to eliminate labor wastes. Position will likely lead to something good in the future and ought to be attractive to man anxious to enter this line of industrial engineering. Location Ohio. Z-1790.

SUPERINTENDENT for our barreling plant. Plant will barrel oil for domestic and export use, and will be a very modern and up-to-date plant in every respect. Require man of considerable experience and maturity, and to such man we will be willing to make very good offer if he can fill specifications. Location New Jersey. Z-1791.

PRODUCTION ENGINEER for company manufacturing full line of gas, coal and electric ranges. Preferably with technical training although not absolutely essential. Must be capable of completely organizing production system and possess full understanding of necessities of position. Excellent opportunity for right man. Location Ohio. Outline past experience and state salary expected to start. Z-1792.

GENERAL MANAGER for established steel stamping and rolling concern in New England. Extensive sales experience and superior executive ability necessary. State business and personal qualifications, education, experience, etc. Location Mass. Z-1793.

MACHINE DESIGNER, with experience and creative ability on development of complicated automatic machinery. American preferred, possessing enough ingenuity and intuition to be able to solve mechanical problems alone. Tool designers, plant, efficiency or production engineers need not apply. Write fully, giving age, experience and patents taken out, if any. Location New York City. Z-1798.

DESIGNER for automotive gas engine. Position involves considerable amount of development work. Should have at least 4 years' experience in this line. Location New York City. Z-1801.

ASSISTANT TO MANAGER of marine department of growing business wanted at once. Good appearance; about 25 years; a willing hard worker. Preferably college man with some sales experience. Salary according to experience. Fine opportunity for advancement. Location New Jersey. Z-1808.

TOOL SUPERVISOR, for large manufacturer of acetylene-welding equipment. Must be well versed in modern tool practice and be capable of supervising tool design and tool production. Location New Jersey. Z-1812.

ASSISTANT PROFESSORSHIP open for young man between 25 and 35 years of age to teach engineering mechanics, machine design and allied subjects. Applicant should have at least 2 years' experience as designing draftsman, or equivalent training. Location New Jersey. Z-1814.

TECHNICAL GRADUATE, to act as time-study man, and for intensive study of shop conditions. Prefer young man with several years' shop experience, part of it at least in time-study work. Give full details of education, experience and references. Location New Jersey. Z-1815.

SUPERINTENDENT, of steel foundry for company making electric-steel castings for furnaces. Location Pennsylvania. Z-1817.

ENGINEER college graduate; some experience in steam; man with power-plant experience will be more suitable. Duties will consist in engineering and making up of propositions to be sent to our foreign offices. Prefer single man, willing in case of need to go abroad. Location New York. Z-1824.

ASSISTANT TO CHIEF ENGINEER of manufacturing company making air-conditioning equipment. No objection to training right man. Technical education preferred. Position involves research of new fields and application of established principles. Age 25 to 40. Location North Carolina. Z-1826.

ENGINEER capable of designing cane-sugar plants. We have immediate prospect where cane-sugar company wishes to have plant redesigned. Should be of good personality and of gentlemanly appearance; perfectly familiar with type of design; able to talk to sugar men operating plant, discussing various changes for remodeling and able to talk Spanish. Prefer a younger man. Should be primarily an engineer, but should have some qualities of a salesman. Location Ohio. Z-1827.

POWER-HOUSE ENGINEER. Plant consists of 2-2500 kw. Curtis turbines with Stirling boilers and mechanical stokers. Position would be to look after boiler room primarily and all mechanical features of power house. Location China. Z-1831.

ENGINEER with mechanical training, preferably automobile experience, for work on development and application of special line of materials for gears and frictions. State age, experience and salary expected. Location Pennsylvania. Z-1832.

DESIGNERS, high grade, with some field experience for heating and ventilating, plumbing and electrical installations in office, factory and general industrial buildings. Foreign service with large American interests. Good personality essential. Three year contract if desired. Location Foreign Service. Z-1838.

PRODUCTION ENGINEER for large typewriter company, thoroughly posted on modern production-control methods. Not necessarily from mechanical point of view but more for use and application of system in controlling production from ordering of material to assembly of product. Age 30 to 40, married man preferred. Location Connecticut. Z-1849.

TECHNICAL GRADUATE desired for instructor in mathematics in engineering college. Must have some advanced work in mathematics. State age, education, experience and enclose recent photo if available. Location Minn. Z-1851.

PRODUCTION AND EQUIPMENT EXECUTIVE. Northern New Jersey manufacturer of medium and heavy machinery of considerable precision, wants young manufacturing man of very best shop training and experience. At first work will deal with maintenance and repair of machine-tool equipment, but must be satisfied that he has supervising ability of high order and that, if occasion arises, he could take superintendence of shop of 500 men, making varied and exacting product, and show splendid results. Give fullest information, including experience, present employer, compensation and expectations. Location New Jersey. Z-1852.

MECHANICAL ENGINEER familiar with quantity production on brass casting specialties. One with initiative to work out his own ideas with view to increase present production. Knowledge of foundry practice helpful but not absolutely essential. Executive ability essential. Salary commensurate with experience and ability. Excellent opportunity to develop into big job. Location N. Y. Z-1856.

ADVERTISING WRITER to take charge of technical copy and catalogs on pumps for large concern. Previous advertising experience desirable. Mining or mechanical graduate with at least 3 years' experience; 25 to 30. Good personality essential. Location New York City. Z-1857.

STEAM-POWER ENGINEER, in charge of power and power distribution in industrial plant manufacturing edible oil and soap stocks. Work would require thorough knowledge of boiler-room practice, steam distribution, heat transfer, condenser practice, the elements of refrigeration and the application of general knowledge of thermodynamics and steam engineering to the use of saturated and superheated steam in oil-refining process. Power is secondary to steam in this plant, although some knowledge of 3-phase, 60-cycle a. c. applications at low voltage would be required. Location Va. Z-1859.

MECHANICAL ENGINEER, capable of taking leading part in our engineering department as a designer and checker, for manufacturer of high-grade light-hoisting machinery for auto trucks, power presses, railroad coaling stations, and general line of structural steel work. Location Michigan. Z-1866.

MECHANICAL DRAFTSMAN, Laurentide Co. at Grand 'Mere, Quebec, 90 miles north of Montreal; a large and progressive pulp and paper manufacturing concern offers good opportunity of advancement, with excellent living conditions, to experienced draftsman on general layout of buildings and machinery. Address communications, stating age, qualifications and experience. Z-1869.

YOUNG MAN to take charge mining and crushing operation under general superintendent. Graduate engineer, 2 or 3 years' experience, preferably with quarry and road preparation. Work is in connection with Mica mining. Location N. H. Z-1867.

MECHANICAL OR ELECTRICAL ENGINEER, technically trained preferred, to fill position as office engineer. Must be familiar with modern practices and operation of central stations. Location Missouri. Z-1873.

PRODUCTION SUPERVISOR, mechanical engineer with experience in production line, must be able to organize department and establish modern methods of control. Permanent, good future. Location New Jersey. Z-1876.

ASSISTANT SUPERVISOR for printing department of large corporation. Must have experience in printing technique and be familiar with office management, as work will consist largely of forms, papers, etc., for modern office systems. Age 29 to 40. Location New York State. Z-1875.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 10th of the month preceding data of issue and should be limited to 45 words. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

POWER-PLANT ENGINEER, can lay out, build and operate power plants of all kind. Location Southwest. SM-5461.

WORKS ENGINEER, SUPERINTENDENT OR MASTER MECHANIC with 15 years' practical and theoretical training in general machine-shop, foundry, sheet-metal and structural work. Specialist in power-plant and industrial engineering. Past experience in railroad shops, chemical plants and textile plants. Good executive and can get results from various classes of mechanical labor connected with above plants. Married, 32, salary commensurate to position, minimum consideration $4000. SM-5462.

MECHANICAL AND ELECTRICAL ENGINEER, technical graduate, desires position as assistant to executive; five years' practical experience, two years as assistant manager of small manufacturing concern. Wants change because present position does not provide opportunities for use of own judgment or initiative. Location immaterial. SM-5463.

PRODUCTION ENGINEER, young, energetic, mechanical-engineering graduate, past two years as production manager in small manufacturing plant; well versed in storekeeping, planning and allied functions; familiar best modern methods of scientific management; varied engineering experience. Minimum $2700. SM-5464.

MECHANICAL ENGINEER, graduate M. I. T., 28, experienced in developing automatic machinery and improving manufacturing processes. At present employed by firm of consulting engineers. Desire position vicinity of New York City. SM-5465.

MECHANICAL ENGINEER, technical graduate, 25, single, desires position in South America. Some knowledge of Spanish. Three years' experience in maintenance work, also some sales experience. SM-5466.

MECHANICAL ENGINEER AND EXECUTIVE, 32; thoroughly experienced in modern production methods of interchangeable parts in volume. Thorough knowledge and practical understanding of industrial engineering and its proper application. Practical experience in designing of automatic machinery, tools, jigs, and fixtures. SM-5469.

MECHANICAL OR WORKS ENGINEER, eleven years' experience in design, maintenance, construction and production. Good organizer and executive. Technical graduate, 33, married. SM-5470.

MECHANICAL AND ELECTRICAL ENGINEER, 36, two years' civil engineering, six years' mechanical and electrical university course; 14 years' engineering experience, including construction of industrial plants, locks and dams, ship yard, powder plant, rifle plant and armor-plate plant, comprising installation of hydraulic, steam, air and electrical machinery. Thoroughly practical with executive ability; not afraid of work or responsibility. No objection foreign service if salary is commensurate with position and location. Minimum United States, $4,000. Willing to enter into partnership with another engineer on equal basis. At present employed, but can arrange to make change on short notice. SM-5471.

MECHANICAL-ELECTRICAL SALES ENGINEER. Technical graduate, 31, single. Nine years' engineering experience; 4 years' shop production upon all types of internal-combustion engines and electrical machinery; 5 years' general engineering experience on steam and internal-combustion engines, power-plants, electric distribution, artificial and natural-gas distribution. Engineer with U. S. Bureau of Standards during war. At present field engineer for firm of mechanical and electrical engineers. SM-5472.

EXECUTIVE, young college graduate, 10 years' sales, manufacturing, executive experience, at present vice-president and manager of large manufacturing firm. SM-5473.

MECHANICAL ENGINEER, Diesel engines, 35, wishes to correspond with reliable concern, contemplating building marine Diesel engines. Ten years' foreign and domestic experience in above line. Fully capable to take complete charge of design and installation of marine Diesel engines and auxiliaries. Would entertain offers from concerns contemplating either buying license or building own design. SM-5474.

MECHANICAL ENGINEER, 24, married; two years' experience in design and installation of plant equipment, power plants and blast furnaces, desires position, preferably in Southern Ohio, along sales or plant engineering lines. Can furnish excellent references from present employer. SM-5475.

INSTRUCTOR OR ASSISTANT PROFESSOR OF MECHANICAL ENGINEERING. Technical graduate with five years of shop, drafting-room, research and teaching experience, desires position on faculty of engineering institution. Age 30, married, available September 15. SM-5476.

MECHANICAL ENGINEER, 12 years' experience in mechanical engineering, safety and personnel work; desires to connect with company willing to give him coöperation along this line. Capable of organizing and managing following departments: safety, dispensary, sanitation, welfare, employment, fire protection, and industrial relations. Particularly interested in connecting with new company just forming, but would consider other offers. SM-5477.

EXECUTIVE, technical graduate, successful experience as engineer, salesman, shop manager, auditor and corporation officer. Salary $7,500. East preferred. SM-5478.

MECHANICAL ENGINEER, and vice-president of large manufacturing company, with special duties in South Atlantic States. Twenty years' experience establishing and managing factories and agencies. Head office at Washington, D. C. Do you want part of his time to promote your interests in the South? SM-5479.

POWER ENGINEER AND EXECUTIVE, 18 years' experience design and construction power stations, heating and ventilating plants, railroad shops, supervision and operation electric-railway power equipment. Age 44, technical graduate. Available September. Location New York City or vicinity. SM-5480.

MECHANICAL ENGINEER, graduate, with shop-experience knowledge of cost accounting, etc., desires position as superintendent or works manager in West or Middle West. References. SM-5481.

ELECTRICAL AND MECHANICAL ENGINEER, technical graduate, 27, four years' manufacturing and maintenance experience, single, wants position with good future. References. Any location. SM-5482.

YOUNG MECHANICAL ENGINEER, 35, 12 years' practical experience on design and construction of special and automatic machinery and machine tools, capable executive, desires connection with reliable firm. Location immaterial. West or Middle West considered. Salary $3000 per year. SM-5483.

MECHANICAL AND COMBUSTION ENGINEER, American, age 27, technical graduate. At present assistant engineer with large steel company; desires connection with progressive firm. Congenial, wide-awake, good personality. Five years' experience in power-plant and heat-treating furnace work including design, testing and operation. Minimum $3300. SM-5484.

SALES ENGINEER, M. I. T., and engineering commission in Navy. Age 23, at present connected with large boiler concern. Desires connection with company marketing power-plant equipment or specialties. Location Western New York or New England preferred. SM-5485.

MECHANICAL ENGINEER AND EXECUTIVE, M. I. T. graduate; 4 years' experience in shipyard; 10 years' marine Diesel engine-building experience, principally on experimental, designing, and testing work; for several years past in charge. SM-5486.

MECHANICAL ENGINEER; 43. Wide experience on power-house work and combustion. Also building construction. Good executive. Desires location in or near Philadelphia. Available immediately. SM-5487.

MECHANICAL ENGINEER graduate, 27, two years' experience piping layout on heating and ventilating systems and power plants. Middle West location desired. SM-5488.

RESEARCH MECHANICAL ENGINEER and physicist, M.E. degree; with training and capacity for fundamental investigations in materials, processes, and instruments; best references; age 29; exceptional record of published work in technical and scientific press; specially qualified as director of research or development laboratory; salary $5000. SM-5489.

GRADUATE MECHANICAL ENGINEER, 3 years' practical experience on machine and erecting work, drafting room, designing steam turbines, Cent. pumps and condensers, estimating, shop orders. Informed on manufacturing methods, routing, shop costs. Age 25, married. Available Oct. 1, 1920. SM-5490.

DRAFTSMAN ENGINEER, experience in oil-well machinery; manufacture of 6" shells and equipment for manufacturing same; general construction in large asphalt refinery. Graduate electrical engineer, wants to connect with company affording excellent opportunity for service, growth, and responsibility. SM-5491.

ENGINEERING EXECUTIVE, 15 years' experience on high-grade mechanical, structural, and combustion engineering, comprising steam and motor-driven pumps, hydraulics, hoisting, cranes, boilers, economisers, etc., for steel and industrial plants. Also planning and production work on large scale. Has held positions as chief draftsman and construction engineer and has been successful at sales work, with leading companies. Age 35. SM-5492.

MECHANICAL ENGINEER, technical graduate, age 25, married, desires position as assistant engineer on industrial work. Four years' experience estimating and design of plant installation, ordnance, etc. Present salary $2700. New York or vicinity. SM-5493.

MECHANICAL ENGINEER, 22 years' experience designing construction and executive commercial work. Stevens graduate. Well known in mining, crushing, metallurgical and cement-machinery fields. Desires responsible position. Location New York City. SM-5494.

ENGINEER OR CHIEF DRAFTSMAN, 10 years' experience; 30; technical graduate. Have successfully handled positions of chief engineer, chief draftsman and secretary and treasurer. Desire responsible position with progressive growing company with chance of advancement. $3500. SM-5495.

MECHANICAL ENGINEER AND EXECUTIVE, 31, technical and practical experience covering 15 years on design and manufacture of special automatic machinery, jigs, dies, fixtures and machine tools. Experienced plant engineer covering plant-layout repair and maintenance of buildings-equipment machinery, etc.; also knowledge of production methods, planning and scheduling. Desires opening where initiative and experience along above lines are wanted. SM-5496.

MECHANICAL ENGINEER, 35. Broad experience including design, production and sale of general equipment, etc., expert draftsman. Can handle correspondence, estimating, purchasing or installation work. Now in New York, desire position out-of-town. SM-5497.

ENGINEERING EXECUTIVE, 11 years' experience on industrial plant planning, construction maintenance and power development. Thoroughly familiar with modern manufacturing methods. At present in charge of engineering department of machinery-manufacturing concern. Age 33. Married. SM-5498.

ENGINEERING EXECUTIVE, about to be released from U. S. Army, desires connection with corporation in need of executive in connection with engineering production, standardization, etc., either on present products or development of new enterprises, designs, ideas, research, or systems. Thorough theoretical knowledge of engineering in its several branches coupled with years of experience. Position sought is somewhat above the average. Kindly give synopsis of proposition in first communication. Will consider propositions requiring only part-time services. SM-5499.

MECHANICAL ENGINEER, graduate, experienced in design and manufacture of machinery. Capable of building up and maintaining efficient organization. Desire position requiring broad-gage man who knows human and business sides of engineering as well as purely technical. Past experience principally with mechanical stokers, steam engines, Diesel engines, air compressors, steam turbines, reduction gears and other power-plant machinery including auxiliaries. $5000. SM-5500.

GENERAL SUPERINTENDENT, of large foundry and machine company desires change October 1. Twenty years' experience in charge of plants employing from 1000 to 5000 men. Excellent record. Salary at present $10,000. SM-5501.

MANAGING EXECUTIVE, 36, graduate M.E. Purdue; 13 years' managerial experience in manufacturing of brass and metal goods, plated-wares, precision tools, paper and paper products. Unusual record as producer and organizer for three well-known companies in U. S. A. and Canada; in general charge of entire product manufacturing and plant. Used to earning $8000. Seeks opening only where small investment or share of increased profits is permitted. SM-5502.

GRADUATE MECHANICAL ENGINEER, 45, experienced in steam-engine and turbine design, desires position as chief draftsman, designing engineer or research engineer, with company manufacturing power-generating machinery in quantity. SM-5503.

SALES ENGINEERS, two mechanical engineers plan to enter business as sales engineers for power-plant and allied equipment. One has 8 years' experience in consulting and sales engineering, the other 8 years' in industrial-plant maintenance. Correspondence is invited from manufacturers desiring representation in Kansas City territory. SM-5504.

MILL SUPERINTENDENT, or metallurgist, member, graduate, M. I. T., married, 31. Seven years' varied experience, largely in mill operation and metallurgical testing for concentration, ammonia leaching, and flotation. References from present emloyers. Available November 1. SM-5505.

CONSULTING MECHANICAL ENGINEER, specialist in design, construction and installation of labor-saving machinery. SM-5506.

FIRE-PROTECTION ENGINEER, 32, married. Technical school graduate. Eight years' experience; familiar with operation and testing of automatic-sprinkler systems and water supplies for same, fire pumps, hydrants, hose and water mains; laying out of watchman service. Location Greater New York or vicinity. SM-5507.

MECHANICAL SUPERINTENDENT, graduate M.E. with 17 years' experience in machine design and manufacturing. Special attention given to tools, stampings, automatic machinery and equipment for increased production. Qualified to take charge of designing force, superintend manufacture along modern economical lines; $3600. Brooklyn, N. Y., preferred. SM-5508.

SALES ENGINEER, 22, three years' experience drafting room of world-wide engineering corporation. Desire opportunity with house handling specialties where general knowledge of power-plant equipment will be of use. Salary offer and details in first letter. SM-5509.

MECHANICAL ENGINEER, 38, married; technical graduate, 18 years' experience in steam engineering reciprocating machinery and unaflow engines, as draftsman, designer, consulting engineer and inventor, desires suitable position in steam engineering, research or experimental. Good record and references. Resourceful, energetic and capable to take charge. Philadelphia or East preferred. SM-5510.

MECHANICAL ENGINEER, age 34. Technical graduate with seven years' experience in power-plant design, general operation, and combustion problems especially. Have made special study of power-station economics and can handle all phases of betterment work. Salary $4000. SM-5511.

MANUFACTURING EXECUTIVE, 20 years' experience as foreman and superintendent. Machine tools, type-setting machines, automobile parts. Economical and efficient tools, gages, and factory equipment a specialty. Have made modern production methods produce. Gladly furnish references and history of experience. SM-5512.

MECHANICAL ENGINEER, graduate M. I. T., '17, with three years' shop and engineering experience as draftsman and assistant to superintendent; desires position as assistant to engineer or executive. SM-5513.

MECHANICAL ENGINEERING AND MANUFACTURING EXECUTIVE, technical graduate, 4 years' machine-shop and drafting-room experience, 14 years in executive positions of responsibility with large corporations in plant layout, construction, maintenance, purchasing equipment, power, and economic factory management; 8 years with present connections. American, married, age 41. Middle West or far West preferred. Salary $5400. SM-5514.

MECHANICAL DIRECTOR, plant engineer or similar position. Technical graduate qualified to assume entire responsibility for the selection, design, layout, preparation of specifications, installation and subsequent operation of electrical and mechanical equipment. Employed during past five years as mechanical director by internationally known corporation to assist in development of required plant for manufacture of drycolors, intermediates, dyestuffs and heavy chemicals. Has handled big things, is constructive, knows details and while accustomed to large responsibilities will be glad to serve as assistant where opportunity also means niche in deep-rooted progressive organization. Location of minor importance. Available immediately. SM-5515.

M. E. GRADUATE, mathematician, very resourceful in devices, intimate knowledge of thermodynamics, 2 years' shop experience, 3 years' designing on heavy high-speed machinery, 2 years' testing on automotive engines and auxiliaries; looking for development work where analysing mind is required. Minimum $2400. SM-5516.

SALES ENGINEER, technical graduate, 31, single; 10 years' technical experience on mechanical and electrical power-plant machinery; gas and coke-oven plants. At present mechanical and electrical engineer with well-known consulting engineer. SM-5517.

SALES ENGINEER, 31, married; technical training, 13 years' experience in machine and tool designing; one year in power-house designing. Desires position with good mechanical concern dealing in machine tools. New York City or vicinity preferred. SM-5518.

ENGINEERING SALES EXECUTIVE, technical graduate, prime of life, experienced in engineering and manufacturing. Demonstrated ability in marketing high-grade and alloy-steel castings, alloy and tool steels, steel specialties, etc., over period of years. Familiar with heat treatments of same. Executive and administrative ability. Constructive sale promotion, presence and address. Substantial representation in every respect. $6000 one year's contract. SM-5519.

MECHANICAL ENGINEER, technical graduate, 30; 8 years' exerience engineering work, 6 years' designing and construction of heavy machinery, one year manufacturing of interchangeable parts, one year in business as distributor of electrical equipment. At present in charge of technical-engineering department. Desires to connect with growing concern as chief engineer, assistant chief or to enter an engineering firm as executive where selling and general business experience is in demand. $5000. SM-5520.

CHIEF DRAFTSMAN, now chief draftsman at large factory making high-grade specialty line similar to adding machine. Specialized in standardization work. Desires location west of Mississippi. Pacific Coast preferred. M. I. T. graduate. SM-5521.

MECHANICAL ENGINEER, 39, technical man with 16 years' practical experience on design, construction operating and testing of steam-electric power stations. Expert on steam turbines, condensers and boiler-room practice. Also manufacturing and commercial experience. Desires engineering executive position. Present position seven years. SM-5522.

HIGH-GRADE EXECUTIVE, 16 years' experience as general superintendent and works manager. Familiar with such products as electrical goods, brass novelties, automobile parts and fire-arms. At present engaged as works manager. SM-5523.

EXECUTIVE ENGINEER, experienced in building up, equipping, and operating tool and alloy-steel mills as well as steel-casting plant. Thoroughly familiar with administrative and sales department organization and expansion. SM-5524.

MECHANICAL ENGINEER, 45, married. World-wide experience extending over 20 years in the exportation of machinery, hardware, steel materials, metals, chemicals, raw materials, etc., seeks executive position in purchasing or export department with responsible manufacturers or exporters. SM-5525.

MECHANICAL AND ELECTRICAL ENGINEER; Columbia graduate, age 27, single. Five years' experience on construction work and in all departments of large electric-light and power company. Connection desired with consulting engineers or in mechanical department of industrial plant. SM-5526.

PROFESSOR OF MACHINE DESIGN, 10 years' successful experience teaching all branches of machine design, engineering drawing, descriptive geometry and mechanism. Five years' practical experience in designing machines. Position desired as head of department giving opportunity for developing and directing courses. Graduate M.E. East preferred. SM-5527.

ENGINEERING AND EXECUTIVE, excellent experience oil-burning boiler installations, turbines, and appurtenances marine engineering. Widely traveled and accustomed to responsibility. At present engaged, but desires position with broad business scope, progressive concern as executive, or representative. Eastern Section, England or France. Age 28. SM-5528.

MECHANICAL ENGINEER, 18 years' experience design, construction and operation of power plants, hydraulics machinery, industrial-building construction and familiar with the design and construction of machinery for the manufacture of chemicals. Can take charge of work and see it through to completion. Can organize a job. SM-5529.

INDUSTRIAL ECONOMIST, practicing in New York, desires association where his demonstrated ability to determine the technical and commercial soundness of existing and prospective enterprises may have full scope. Broad experience in business surveys management, organization, operation and accounting. Connection must be worth $12,000 annually with unlimited opportunities. SM-5530.

CHEMICAL ENGINEER, 27, Columbia, 1915. Five years in coal-tar distillation, construction, maintenance, operation, technical development. Desires connection with petroleum, refining or similar company offering opportunity for promotion to executive position in manufacturing department. Salary $3000. Available September 15. SM-5531.

GENERAL SUPERINTENDENT OR SUPERINTENDENT, 36; 18 years' experience from machinist, toolmaker, tool designer, chief tool designer, draftsman, chief draftsman, etc., to general superintendent. Practical experience, technical knowledge with executive ability. Location between Somerville, New Jersey, and Brooklyn, New York. Salary $5000. SM-5532.

MARINE ENGINEER, graduate M. I. T.; 20 years' executive and practical experience in maintainance, operation and construction of steam vessels. Held very important executive position in Government service during war. Lately demobilized and desires connection with established steamship company where executive and professional ability of highest quality

will be appreciated and adequately remunerated. SM-5533.

MECHANICAL ENGINEER, 29; seven years' experience; one year assistant engineer in operation of thirty plants; now employed as general manager of small factory. Some experience in sales work; familiar with general and cost accounting; competent to handle business and sales correspondence. Desires position as assistant to executive in larger organization. SM-5534.

LUBRICATION ENGINEER, and master mechanic. Wide experience in steel plant, turbines, engines and general machinery. SM-5535.

INDUSTRIAL ENGINEER and draftsman, 32, married. Twelve years' mechanical experience. Specializing in re-organization and general plant layout for production efficiency, routing, scheduling, time study, modern systems of mechanical transportation as used for economics and rapid production. Also actual experience with machine-shop equipment, foundry and millwrights, the design of labor-saving and safety devices, and practicability of working conditions in the factory. At present employed on layout mechanical equipment for a twenty-five million dollar rubber-tire plant. Available October 1. Quite familiar with design and construction of factory buildings. Desires to locate with organization having big opportunities for industrial work. SM-5536.

MECHANICAL ENGINEER, 36; technical graduate, specialist on power-plant operation, efficiency, combustion, uses of fuel oil, steam, air, testing of apparatus. Experienced in automobile-production engineering, ex-instructor in M.E. dept. of engineering college; selling in Mexico. French, Spanish, German. Available September 1. SM-5537.

GENERAL OR WORKS MANAGER; 20 years' manufacturing experience acquired as general manager, factory manager, chief engineer, and superintendent. Have successful record as executive. Especially qualified on factory construction, equipment organization, production and costs. Have placed several industries on paying basis. Technically trained, expert mechanic. SM-5538.

MECHANICAL OR PLANT ENGINEER, technical graduate, excellent executive; successful in handling all classes men; diplomatic and tactful; 18 years' experience in electrical and mechanical engineering including installation and maintenance, industrial-plant, power, heating and lighting layout; organization and production engineering, and purchasing. SM-5539.

WORKS ENGINEER, OR SUPERINTENDENT, technical graduate, 32, married; 6 years' experience as machinist, 2 years' as draftsman and designer, 4 years' as executive, (shop superintendent, efficiency engineer, mechanical engineer, asst. works engineer). Strong personality, good executive. Permanent position desired in Middle West. Minimum salary $4500. SM-5540.

MECHANICAL ENGINEER, technical graduate, member, 20 years' experience in designing and engineering work. Capable of directing and taking full charge of work. Desires responsible position. Salary $5000-$6000. SM-5541.

MECHANICAL ENGINEER, M. I. T., now employed; 5 years' experience in general plant engineering, maintenance and construction. Experimental and development testing of electric motors and works-management investigation. Desires position involving production and management with industrial concern. SM-5542.

PRODUCTION ENGINEER, desires position in Philadelphia; 28, technical graduate, 4 years of experience in planning, routing and scheduling in machine shops and following up the material end. SM-5543.

INSTRUCTOR IN MECHANICAL ENGINEERING required to teach mechanical laboratory and internal-combustion engineering. Engineering graduate with some practical experience desirable but not essential. $1800 for college year of nine months. Location Philadelphia. SM-5544.

MECHANICAL ENGINEER, technical graduate 1911, 33, married. Teaching and practical experience covering machine design, construction, manufacturing maintenance and repairs of steam, air and hydraulic machinery including pipe fitting and layouts. Energetic, resourceful, good personality and excellent references. Desires permanent position with progressive concern. SM-5545.

FACTORY SUPERINTENDENT, assistant; graduate mechanical engineer (evenings); 26; experienced in design of jigs, fixtures, dies and special machinery for interchangeable production; 10 years' practical all-round experience, desires position as assistant to production or factory superintendent. Location immaterial. Salary $300 per month. SM-5546.

ASSISTANT TO WORKS MANAGER OR TO SUPERINTENDENT. Capable young man; last 3 years chief draftsman with large New York manufacturing concern; 7 years' practical experience including design of tools, jigs, fixtures, gages, etc., modern labor-saving devices and factory arrangements; possesses inventive ability. Desire change with progressive firm. Location New York or immediate vicinity. SM-5547.

INDUSTRIAL ENGINEER, 25, married; college man with valuable practical experience in rate setting, special investigation, research, development, etc., desires position as assistant or head of efficiency department or as manager's assistant. Now employed by large nationally-known organization, has satisfactory reason for desiring change. SM-5548.

MECHANICAL ENGINEER, technical graduate, age 29; 4 years' industrial and public-utility engineering; 2 years' military engineering. Desires position with firm of industrial engineers; executive position in growing concern; or assistant to high executive. Good organizer, loyal, economical, and can maintain prestige and dignity of high office. Now employed, desires to leave Public Utility Work. Location immaterial. Salary $3600. Permission given to wire C. O. D. for complete record. SM-5549.

MECHANICAL ENGINEER, M. I. T. graduate, 27, married; experience in power-plant design and operation, oil refinery and industrial maintenance and construction, expert draftsman, executive ability, desires permanent connection in responsible position. Location Eastern States, preferably Massachusetts. SM-5550.

FACTORY MANAGER, SUPERINTENDENT, CHIEF ENGINEER; over 15 years' successful varied experience, including manager, covering practically all phases of manufacturing of highest grade lines. Now employed on important engineering work in plant of over 9000, and wishes relocation. Graduate engineer, American, 38, married. Minimum salary $6000. SM-5551.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER SEPT. 18, 1920

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 386.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by Sept. 18, 1920, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

HUTCHINS, AGASSIZ T., Superintendent Steam Plants, Alabama Power Co., Birmingham
LEWIS, CHARLES F., Plant Manager, Standard Portland Cement Co., Leeds

Arizona

DUNBAR, J. B., General Superintendent, Yuma Ice Electric & Manufacturing Co., Yuma
FAUST, PER A., Master Mechanic, International Smelter, Miami

California

BERCETCHE, FIRMO, JR., Draftsman, Union Oil Co. of California, Los Angeles
BOWLUS, GLENN H., Instructor Mechanical Engineering, California Inst. of Technology, Pasadena
DITTUS, FREDERICK W., Job Engineer, Standard Oil Co., El Segundo
DORWARD, GEORGE D., Dorward Engineering Co., San Francisco
ENOS, JOHN A., Secretary-Treasurer, Western Forge & Manufacturing Co., Los Angeles
GARY, CHARLES B., Ensign, U. S. Navy, U. S. S. Missoula, San Francisco
HOLDEN, JESSE N., Refinery Engineer, Union Oil Co., Oleum
IRVIN, LESLIE A., Chief Mechanical Engineer, Baker Iron Works, Los Angeles
KEESEE, WESLEY E., Mechanical Engineer, Wilshire Oil Co., Los Angeles
MAZURETTE, ALBERT J., Chief Engineer & Member of Firm, Wieland, Mazurette & Wieland, Modesto
MORELAND, GEORGE E., President and General Manager, Western Forge & Manufacturing Co., Los Angeles
RUSHTON, LEON E., Mechanical Engineer, State Department of Engineering, Sacramento
SMALL, ERNEST G., Lieutenant Commander, U. S. N., Senior Assistant Engineer Officer U. S. S. New Mexico, San Francisco
STEVENSON, WILFRED C., Chief Engineer, Pacific Portland Cement Co., San Francisco
WRIGHT, EDWARD P., Designs Engineer, Standard Oil Co., El Segundo

Colorado

MORSE, JAMES L., Professor Mechanical Engineering, Colorado School of Mines, Golden

Connecticut

BAILEY, C. J., Checker, Lake Torpedo Boat Co., Bridgeport
BEAN, LAWRENCE G., Sales Engineer, The Bristol Co., Waterbury
BEHLER, EDWIN J., Chief Draftsman, Wescott & Mapes, New Haven
BLANCHARD, CHARLES H., Works Manager, Pratt & Cady Co. Inc., Hartford
BUTLER, WILLIAM L., Engineer, Heppenstall Forge Co., Bridgeport
GEORGE, STEPHEN A., Scovill Manufacturing Co., Waterbury
GOODRICH, MILES E., Assistant to Works Engineer, Richards & Co., Stamford
HART, WALTER H., Vice-President & General Superintendent, The Stanley Works, New Britain
HAVICAN, RAYMOND V., Technical Instructor, Yale & Towne Apprentice School, Stamford
LAWTON, FRANK W., Winchester Repeating Arms Co., New Haven
MAGARGAL, HEMAN C., Superintendent, Landers, Frary & Clark, New Britain
MARSHALL, ALBERT T., Chief Engineer, The Automatic Refrigerating Co., Hartford
PHILLIPS, EDWIN T., Superintendent of Power, Eastern Connecticut Power Co., Norwich
RAYMOND, JOSEPH F., Supervisor of Training & Apprentice Shop, Winchester Repeating Arms Co., New Haven

SCHENCK, WILLIAM A., Vice-President, The Bassick Co., Meriden
STEVENS, CLARENCE C., Chief Draftsman, The New Departure Manufacturing Co., Bristol
SULLIVAN, RAYMOND H., Superintendent of Methods, The Yale & Towne Manufacturing Co., Stamford
WOLD, ERNST P., Mechanical Engineer, Bridgeport Metal Goods Manufacturing Co., Bridgeport

Delaware

MOORE, MORTIMER J. P., General Arrangement Draftsman, E. I. DuPont de Nemours & Co., Wilmington

District of Columbia

BAILEY, ETHEL H. (Miss), Technicist, Navy Department, Bureau of C. & R. Aircraft Division, Washington

Georgia

McBURNEY, WILLARD B., Efficiency Engineer & Sales Engineer, W. B. McBurney, Atlanta

Illinois

ANKELE, MORITZ A., Chief Draftsman, C. & E. I. R. R. Oaklawn, Danville
BOARDMAN, CLARK C., Assistant General Manager, Western United Gas & Electric Co., Aurora
CARTER, J. H., Aluminum Ore Co., East St. Louis
CLAUSSEN, ARTHUR W., Assistant Engineer, Underwriters' Laboratories, Chicago
DRAKE, ERNEST A., Works Manager, Benjamin Electric Manufacturing Co., Chicago
HAGEMEYER, HENRY F., Sales Engineer, Doehler Die Casting Co., Chicago
HARDY, SIMEON J., Assistant to Mechanical Engineer, Booth Fisheries Co., Chicago
JACKSON, MAURICE M., Designing & Construction Engineer, The Lehon Co., Chicago
LINDBERG, AUGUST E., Chief Engineer, Moline Tool Co., Moline
McBRIDE, OLIN R., District Manager, Andrews Bradshaw Co., Chicago
MULDAUR, GEORGE B., General Agent, Underwriters' Laboratories, Chicago
SHOLTES, STEPHEN, Secretary & Chief Engineer, Wittenmeier Machinery Co., Chicago
STACK, J. W., Chief of Technical Staff, Standard Oil Company of Indiana, Chicago
STREICHER, IRVING H., Head of Drafting School, Cayne Trade & Engineering School, Chicago
WELTY, ALBERT B., Emerson Brantingham Co., Rockford
WETHERBEE, ASHUR U., W. A. Gilchrist, Chicago
WHARRY, MAJOR E., Teacher, Bradley Polytechnic Institute, Peoria

Indiana

BLAIR, GEORGE W., Chief Engineer & Woolen Mill Superintendent, Mishawaka Woolen Manufacturing Co., Mishawaka
BUTTERWORTH, HENRY L., Chief Draftsman, Alena Steam Products Co., Indianapolis
ROWAND, ELLWOOD M. JR., Engineering Assistant, N. Indiana Gas & Electric Co., Lafayette

Iowa

DAVIS, D. LOREN, Chief Draftsman, Teetor Adding Machine Co., Des Moines
HARRIS, CHARLES H., Electrical & Mechanical Engineer, Mississippi River Power Co., Keokuk

Kansas

MURRAY, WILLIAM H. G., Superintendent of Maintenance, The Solvay Process Co., Hutchinson
PHILBRICK, FREDERICK C., Assistant Works Manager, Morton Salt Co., Hutchinson

Louisiana

MARSH, RICHARD O., President, Port Barre Hardward Lumber Co., Port Barre
MEVERS, ROY E., Mechanical Engineer, Prather & Stephens, Baton Rouge

Maryland

HUBER, FREDERICK, Superintendent, Stoker Department, Flynn & Emrich Co., Baltimore
HUGHES, ADRIAN, JR., Superintendent Motive Power, United Railways & Electric Co., Baltimore
MARSHALL, WILLIAM, Maintenance Engineer, Davison Chemical Co., Baltimore
POOLE, EDWARD P., Supervisor of Shops, Baltimore & Ohio R. R. Co., Baltimore
WOOLLEN, CHARLES E., Supervisor Mechanical Equipment Installation, Consolidated Gas, Electric Light & Power Co., Baltimore
YOUNG, PERCY A., Vice-President & Mechanical Engineer, Y-Zer Corporation, Baltimore

Massachusetts

ARNOLD, LYMAN, Engineer in Charge of Transformer Department, General Electric Co., Lyman
BALCOME, SAMUEL E., Chief Steam Engineer, Graton & Knight Manufacturing Co., Worcester
BARTLEY, FRANCIS E., Sales Engineer, The Blanchard Machine Co., Cambridge
BODE, JOHANNES C. P., Chief Draftsman, Heald Machine Co., Worcester
BONNER, ROBERT P., C. H. Tenney & Co., Boston
BURKE, HENRY M., Mechanical Engineer, Mount Hope Finishing Co., North Dighton
CARTER, FREDERIC W., Engineer of Power, Maintenance & Construction, Gilbert & Barker Manufacturing Co., West Springfield
CLAMPIT, RALPH V., Draftsman, Rolls-Royce of America, Inc., East Springfield
DAVIS, ALLAN L., Production Engineer, James Hunter Machine Co., North Adams
DIETZ, LEWIS H., Assistant to Products Engineer, Walworth Manufacturing Co., South Boston
DINGENS, CARL L., Superintendent, American Pad & Paper Co., Holyoke
FELTON, GEORGE W., Chief Engineer & Works Manager, Crofoot Gear Works, Inc., Cambridge
GRINFIELD-COXWELL, J. EDWARD, Boston
HATFIELD, HARVEY C., Chief Engineer, Gillette Safety Razor Co., So. Boston
HILL, CHARLES H., Chemical Paper Co., Holyoke
JOHNSON, PAUL R., Engineer, American Steel & Wire Co., Worcester
KIVLIN, ALFRED P., North Attleborough, Mass.
LEAVITT, PRESCOTT A., Chief Engineer, Merrimack Manufacturing Co., Lowell
MAYER, JOSEPH, Industrial Engineer, National Industrial Conference Board, Boston
MAYOH, FRANK H., Mechanical Design and Development Engineer, National Blank Book Co., Holyoke
MEADER, RAYMOND F., The Whitin Machine Works, Whitinsville
MOREHOUSE, JOHN A., General Manager, Eagle Oil & Supply Co., Boston
MURRAY, GEORGE S., Cellugraph Engineering Corp., Boston
PEARSON, JOSEPH K., Assistant Mechanical Engineer, John A. Stevens, Lowell
ROBBINS, DONALD G., Engineer, Hornblower & Weeks, Boston
ROPER, WALTER F., Works Manager, Springfield Automatic Screw Machine Corpn., Fitchburg
SEITZ, RAYMOND V., Industrial Engineer, Cooley & Marvin Co., Boston
SINCLAIR, HARRY R., President, Worcester Stamped Metal Co., Worcester
SKERRETT, WILLIAM H. W., Assistant to Superintendent, Watertown Arsenal Foundry, Watertown
SMITH, LEONARD F., Assistant Superintendent, United States Envelope Co., Springfield
SMYTHE, JOHN J., JR., Management Engineer, Thompson & Lichtner Co., Boston
STURGES, HARRY A., Production Superintendent, Northway Motors Corp., Natick
WARREN, CHARLES B., Treasurer & Mechanical Engineer, W. Warren Thread Works, Westfield

Michigan

FINCH, FRANK R., Assistant Professor Engineering Department, University of Michigan, Ann Arbor
GILBERT, CHARLES T., Superintendent, Saginaw Manufacturing Co., Saginaw
GRISWOLD, THOMAS, JR., Chief Engineer, The Dow Chemical Co., Midland
HERZOG, JOHN A., Chief Draftsman, Reo Motor Car Co., Lansing
JOHNSON, SIDNEY E., Builder (Self), Redford
JUNE, ROBERT, Diamond Power Specialty Co., Detroit
MITCHELL, WILLIAM M., Assistant Superintendent, Board of Water Commissioners, Detroit
POTE, KENNETH E., Timken-Detroit Axle Co., Detroit
ROLAN, ANDREW A., Assistant Factory Manager, American Electrical Heater Co., Detroit
SEABROOK, CHARLES R., Chief Engineer, The H. M. Lane Co., Detroit
WEBSTER, WALTER G., Maintenance Engineer, Maxwell Motor Co., Inc., Highland Park
ZEDER, FRED M., Chief Engineer, The Studebaker Corp., Detroit

Minnesota

BUENGER, ALBERT, Mechanical & Electrical Engineer, C. H. Johnston, St. Paul
KELSEY, JOHN W., General Superintendent, Water Department, St. Paul
PRIEDEMAN, GEORGE W., Vice-President & General Manager, Minneapolis Ornamental Iron Co., Minneapolis
SAVAGE, ARTHUR H., President, Savage & Winter Co., St. Paul
TURNER, CLAUDE A. P., President C. A. P. Turner Co., Minneapolis

Missouri

McKINSTRY, FRANK Y., Designing & Construction Engineer, Gillespie & McKinstr St. Louis
ROARK, JAMES E., Chief Draftsman, Smith & Sons Manufacturing Co., Kansas City
STOLZ, PAUL L., Superintendent, Smith & Sons Manufacturing Co., Kansas City

Montana

TORGERSON, ALFRED C., Manager, Torgerson Brothers, Billings

New Hampshire

BOSWORTH, NORMAN S., Engine Draftsman, Atlantic Corp., Portsmouth

New Jersey

BEAVEN, HARRY E., Assistant Service Engineer, T. A. Edison, Inc., W. Orange
BURGESS, ROBERT W., Tool Designer, International Motor Co., New Brunswick
CUNEO, ALBERT R., Jersey City
DEMANT, HANS W. C. J., Superintendent, Thomas A. Edison, West Orange
EASON, CLARENCE M., Vice-President, Hyatt Roller Bearing Co., Newark
ELDERKIN, ARTHUR T., Designing Draftsman (Marine), Submarine Boat Corp., Port Newark
ENGELMAN, HERMAN C., Estimator, Crucible Steel Co. of America, Harrison
FREDERICK, RHEUEL H., Chief Engineer & General Manager, Twinvolute Pump & Manufacturing Co., Newark
GARVIE, REUBEN, Jersey City
GLOVER, TRUMAN J., Chief Designing Engineer, Federated Engineers Development Corp., Jersey City
HARRIS, EUGENE E., The Controller Co., Inc., Arlington
JONES, WILLIAM F., Chief Draftsman, Geo. White, M.E. Jersey City
KENNEY, JOSEPH A., Designing Draftsman, Eagle Rock Manufacturing Co., Verona
KRAUSS, ARTHUR H., Engineer, Scientific Department, Federal Shipbuilding Co., Kearney
LAMB, ARTHUR W., Production Engineer, Riegelsville
LARR, ROBERT B., Head of Planning Department, Gould & Eberhardt, Newark
LOGAN, CHARLES N., Superintendent, Fuel Briquet Co., Trenton
OWEN, CHARLES D., Chief Engineer, Passaic Print Works, Passaic
PAYNTER, WILLIAM H., Resident Industrial Engineer, Johnson & Johnson, New Brunswick
STARK, WILLIAM D., Passaic
STEVENS, EDWIN A., JR., 2d Vice-President, Hoboken Land & Improvement Co., Hoboken
STOTT, JAMES M., Superintendent, The Baylis Co., Bloomfield
SUTER, FRANK F., Mechanical & Experimental Engineer, Empire Cream Separator Co., Bloomfield
SVIDLO, IVAN A., Tool Designer, Monroe Calculating Machine Co., Orange

TANIS, GILBERT B., Engineer, John W. Ferguson Co., Paterson

TILGHMAN, RICHARD H., Designing Engineer, Precision Instrument Co., Newark

UDERITZ, HARRY G., Draftsman, Boiler Works, Babcock & Wilcox Co., Bayonne

WALLACE, WILLIAM J., Managing Engineer, Motor & Generator Department, Sprague Electric Works, Bloomfield

WALTON, CHARLES W., JR., Ridgewood

New York

BARKER, HORACE C., Advertising Editor, "Machinery," New York

BARNES, LLEWELLYN T., Chief Draftsman, Neptune Meter Co., Long Island City

BARNES, ROBERT G., T. E. Murray, Inc., New York

BARTON, SAMUEL R., Engineer, The S. S. White Dental Manufacturing Co., Prince Bay, S. I.

BEADLE, WALTER J., National Aniline & Chemical Co., Buffalo

BLACK, DONALD R., L. W. F. Engineering Co., College Point

BORDZUK, WALTER S., Plant Layout Supervisor, Sperry Gyroscope Co., Brooklyn

BURNETTE, ALGERNON R., President, A. R. Burnette Corpn., New York

CARPENTER, HOWARD D., Mechanical Engineer, Hodgman Rubber Co., Tuckahoe

CARTER, ZENAS W., Manager, Material Handling Machinery Manufacturers' Assn., New York

CARTER, WILLIAM C., Accountable Officer & Property Manager, Rochester District Ordnance Office, Rochester

CHESLER, ISIDOR, Industrial Engineer, Eagle Pencil Co., New York

COLSON, ERIC G., Supt. and General Foreman, Ford Instrument Co., New York

CONNER, JOHN A., Senior Designing Draftsman, Dunlop America, Ltd., Buffalo

DALE, RICHARD, Assistant Plant Engineer, Shuttleworth Brothers Co., Amsterdam

DANCY, JASPER J., Assistant Supervising Engineer, American Chicle Co., New York

DAVIS, ARTHUR C., Mechanical Engineer, N. Y. Bridge & Tunnel Commission, Hall of Records, New York

DEVLIN, EDWARD J., Superintendent, The Flatbush Gas Co., Brooklyn

DICESARE, GEORGE E. N., Assistant Electrical Engineer, New York & Queens Electric Light & Power Co., L. I. City

DOELL, GEORGE E., Assistant Chief Inspector, E. W. Bliss Co., Brooklyn

DuBOIS, LESTER W., Superintendent, Henry DuBois Sons Co., New York

DUPUY, THOMAS F., Superintendent Buffalo Division, J. H. Williams & Co., Buffalo

DURBIN, PAUL C., Engineer, Celite Products Co., New York

DURBIN, WILLIAM O., Engineer of Tests, National Aniline & Chemical Co., Buffalo

EVANS, RANDALL E., U. S. Air Service, Mitchell Field

EVANS, RAYMOND S., Field Superintendent, Almirall & Co., New York

FERNALD, BENJAMIN G., Consulting Engineer, New York

FLICKINGER, CHARLES D., Chief Draftsman, M. H. Treadwell Co., Inc., New York

FOWLER, WILLIAM H., JR., Asst. Installation Engineer, De LaVergne Machine Co., N. Y.

FRANKLAND, FREDERICK H., Consulting Engineer, New York

GANNETT, MALCOLM F., Patent Attorney, Corning Glass Works, Corning

GINSBERG, JOSEPH C., Student Engineer, Worthington Pump Co., Buffalo

GOLDBERG, NATHAN L., Chief Draftsman,

GRAHAM, JOHN L., Consulting Mechanical and Supervising Engineer, Tupper Lake

GREENWOOD, FRANK E., Mechanical Engineer, Joseph H. Wallace & Co., New York

HARPER, WILLIAM J., Steam Engineer, Donner Steel Co., Inc., Buffalo

HENRY, CHARLES A., Draftsman, N. Y. Edison Co., New York

HERENDEEN, FREDERICK W., Secretary, National Boiler & Radiator Manufacturing Assn., Geneva

HESSE, OTTO H., Bronxville

HEWETT, THEODORE C., Assistant Engineer, H. H. Williams & Co., Buffalo

HIBBARD, HARRY H., Supervisor, Y. M. C. A. Technical School, Buffalo

HOERNER, JOSEPH F., Assistant Manager, New York Office, The Baldwin Locomotive Works, New York

HOFMANN, ADOLPH F., Vice-President and Treasurer, Porter & Hofmann, Inc., New York

HULSE, GEORGE E., Chief Engineer, Safety Car Heating & Lighting Co. (Re-election), New York

HYDE, ASA P., Chief Engineer and Building Manager, Security Mutual Life Insurance Co., Binghamton

HYDE, ERWIN C., Engineer, Security Mutual Building, Binghamton

JENNINGS, LELAND M., Draftsman, Worthington Pump & Machine Corp., Buffalo

JONES, ALBERT V., Assistant Master Mechanic, H. H. Franklin Manufacturing Co., Syracuse

KARES, EDWARD H., Assistant Purchasing Agent, the J. G. White Engineering Corp., New York

KELLY, JOSEPH M., Sales Engineer, Hyatt Roller Bearing Co., New York

KENT, ROSCOE, Vice President and General Manager, Mercury Engineering Co., Inc., New York

KINDERVATER, JULIUS, Mechanical Superintendent, American Locomotive Co., New York

KRETSCHMER, ERNEST, Machine Engineer, E. W. Bliss Co., Brooklyn

KRIEG, WILLIAM E., Woodhaven, L. I.

LAPKIN, JOHN D., Chief Engineer, American Die & Tool Works, Brooklyn

LORD, JAY W., General Manager, Service Department, Harrolds Motor Car Co., Long Island City

LOWRY, EDWARD N., Associate Manager, The Meldrum Semon Greiner Co., Syracuse

MacLEHOSE, FRANCIS, Assistant Superintendent, Waterside Section, New York Edison Co., New York

MADGETT, JOHN H. F., Tool Designer, Induction Motor Department, General Electric Co., Schenectady

MAGGIN, M. DANIEL, Assistant Engineer, N. Y. Rotary Motor Co., New York

MAKIN, ARTHUR T., Designer, Harrison Radiator Corp., Lockport

MARKTHALER, LEO V., Production Department, Kertscher & Co., Elmira

MARTIN, FREDERICK W., Mechanical Engineer, Franklin Supply Co., New York

MAXWELL, HARRY, Emerson Engineers, New York

MEANY, EDWARD A., Tool Designer, Sperry Gyroscope Co., Brooklyn

NORTH, RICHARD A., Mechanical Engineer on Experimental Work, The Barrett Co., New York

PALMER, MERVYN W., Mechanical Engineer, Famous Players Lasky Corpn., Long Island City

PATTERSON, FRANKLIN M., Consulting Engineer, New York

PFANNENSCHMIDT, HENRY G., Machine Designer, J. G. White Engineering Corp., Brooklyn

PIERCE, RAYMOND C., Engineer, Development Department, Linde Air Products Co., New York

PRINGLE, JOSEPH G., Ice Service Company, Inc., New York

RICHARDSON, HARMOND B., Mechanical Engineer, Philippine Vegetable Oil Co., New York

RIKLIN, EDWARD C., Chief Engineer, Buffalo Steam Pump Co., Buffalo

ROBERTSON, MAC T., Manager of Sypho Department, "Automatic" Sprinkler Co. of America, New York

RUGGE, GEORGE J., Mechanical Engineer, Moody Engineering Co. Inc., New York

SAVILLE, ALLEN J., Resident Engineer, DuPont Engineering Co., Buffalo

SCHRAEDER, O. A. RUDOLPH, J. W. Sanders Co., New York

SCOTT, CAMPBELL, President, Technical Advisory Corpn., New York

SMITH, GEORGE J., Mechanical Expert, Galena Signal Oil Co., New York

SMITH, HERMAN B., The Babcock & Wilcox Co., New York

STRICKER, EDWIN C., Draftsman & Estimator, W. G. Cornell Co., New York

SULLIVAN, LEO G., Service Engineer, Atlas Steel Casting Co., Buffalo

TERRY, WALTER S., Holtsville, L. I.

WARE, WALTER C., Vice President & General Superintendent, Fay & Bowen Engine Co., Geneva

WEINERT, ROLAND E., Superintendent, Wm. Demuth & Co., Richmond Hill, L. I.

WELLS, FRED S., Engineer, Stephens-Adamson Manufacturing Co., New York

WENDT, EDGAR F., Vice President & Treasurer, Buffalo Forge Co., Buffalo

WEYER, LEO O., General Foreman, Boucher Manufacturing Co., New York

WOERWAG, CARL A., Link-Belt Co., New York

WORTHINGTON, WARREN, President & General Manager, Worthington Manufacturing Corp., Rexleigh

ZAUTNER, NORMAN G., Student Engineer, General Electric Co., Schenectady

ZILBOORG, JAMES M., Editor, Foreign Service Department, Rand, McNally & Co., New York

North Carolina

BARTHOLOMEW, BRADLEY W., Manager, Southern Office, Flynt Building & Construction Co., Charlotte

HARRELSON, JOHN W., Associate Professor Mathematics, North Carolina State College, West Raleigh

HOPE, BERTRAM C., Charge of Engineering Department, Champion Fibre Co., Canton

SPANGLER, SAMUEL, Chemical Engineer, Chemical Construction Co., Charlotte

Ohio

ATKINSON, GEORGE P., Sales Engineer, Allis-Chalmers Manufacturing Co., Cleveland

BERTHEL, CHARLES J., Designing Engineer, Goodyear Tire & Rubber Co., Akron

BRATTIN, CLAUD L., Tool Designer, The Cleveland Metal Products Co., Cleveland

BROWN, GARNET C., Engineer, Armament Section Engineering Division, Air Service, U. S., McCook Field, Dayton

BURLINGAME, JOHN H., Adjuster, Western Adjustment & Inspection Co., of Chicago, Cincinnati

CALDWELL, JAMES R., Inspector of Navy Material, U. S. Government, Cincinnati

CARROLL, FRANK V., Engineer, Leif Lee, Youngstown

CORYELL, WILLIAM C., Consulting Engineer, The General Fireproofing Co., Youngstown

DOPKE, JOHN C., Planning Engineer, Parish & Bingham Corpn., Cleveland

ELHOFF, ERWIN J., Laidlaw Works, Worthington Pump Corpn., Cincinnati

ELLERY, ROBERT M., Production Manager, Toledo Tap & Die Co., Toledo

GLOYD, JAMES R., President, The James R. Gloyd Co., Cleveland

GOODWIN, GEORGE A., Designer, U. S. Air Service, Engineering Division, McCook Field, Dayton

HOLZBAUR, FREDERICK J., Mechanical Engineer, St. Marys Wheel & Spoke Co., St. Marys

HUND, CARL P., Willys-Overland Co., Toledo

JUNKINS, RAYMOND D., Cadet Engineer, Bailey Meter Co., Cleveland

LEWIS, CYRIL E., Results Engineer, The Acme Power Co., Toledo

LEWIS, GEORGE F., Treasurer, The Anderson Rolled Gear Co., Cleveland

LINDEN, CARL E., Chief Engineer, Cincinnati Planer Co., Cincinnati

LOOMIS, ALLEN, Engineer, Willys-Overland Co., Toledo

NEAD, JOHN H., Chief Metallurgist, American Rolling Mill Co., Middletown

NICHTA, JOHN J., Designer & Assistant Engineer, Aluminum Manufacturers Inc., Cleveland

PATTISON, ROBERT C., Mechanical Engineer, Wheeling & Lake Erie Ry. Co., Brewster

ROURKE, WALTER R., Mechanical Draftsman, Brier Hill Steel Co., Youngstown

SCHOENING, FREDERICK C., Designer, International Harvester Co., Akron

SCHUTZ, HAROLD R., Vice President & Engineer, The Northern Engineering Co., Toledo

STANSBURY, G. L., Assistant to President, The Republic Rubber Corp., Youngstown

STERTZBACH, HARRY W., Assistant Chief Mechanical Engineer, Buckeye Steel Castings, Co., Columbus

TERRILL, FRANKLIN E., Tool Designer, The Warner Swasey Co., Cleveland

THIEL, B. C., Assistant Engineer, The C. & G. Cooper Co., Mount Vernon

TISHLER, FRANK J., Assistant to Engineer, The Cleveland Motor Cycle Manufacturing Co., Cleveland

WALKER, Frank L., Patent Attorney, Dayton
WATSON, C. Roy, Consulting Engineer, Allen Motor Co., Columbus

Oklahoma

HOLMES, Will K., Superintendent, The Texas Co., Tulsa
PEARL, James W., Chief Engineer, Holcomb Engineering Co., Tulsa

Pennsylvania

ANGELOTTI, Germano A., Mechanical Draftsman, Westinghouse Electric & Manufacturing Co., East Pittsburgh
BARTELS, William A., Designing Engineer, Hammermill Paper Co., Erie
CALLAWAY, Clarence R., Works Manager, Gurney Elevator Co., Honesdale
CAMPBELL, William S., Engineer, Link Belt Co., Philadelphia
CAWLEY, G. W., Superintendent of Construction, Schmidt & Ault Paper Co., York
DEIKE, George H., President, Mine Safety Appliances Co., Pittsburgh
DIMAANO, Gregorio C., Special Apprentice, Baldwin Locomotive Works, Philadelphia
DIMLER, Ernest H., Sales Engineer, Bethlehem Foundry & Machine Co., Bethlehem
DUNCAN, William Y. Jr., Chief Engineer, Lee Tire & Rubber Co., Conshohocken
ERMOLD, Elmer A., Secretary & General Manager, C. Walker Jones, Inc., Germantown, Philadelphia
FRY, Horace P., Teacher, Mechanical Engineering Department, University of Pennsylvania, Philadelphia
GLEASON, Ronald P., Principal, Technical High School, Scranton
GOODFELLOW, Alfred, Mechanical Engineer, Lukens Steel Co., Coatesville
GREVE, Edgar E., Chief & Consulting Engineer, Oil Well Supply Co., Pittsburgh
HAYNES, Harry S., Salesman, Manning, Maxwell & Moore, Pittsburgh
McCLINTOCK, Frank S., Chief Engineer, Dravo Doyle Co., Pittsburgh
McFADDEN, Benjamin C., Engineer in Charge of Power Plant Section, Aluminum Company of America, Pittsburgh
MORGAN, Earl L., General Foreman, Gun Department, Bethlehem Steel Co., Bethlehem
REBER, Alvin D., Engineer, The Barrett Co., Latrobe
SCHALLER, Robert H., Superintendent of Operation, Pittsburgh By-Product Coke Plant, Pittsburgh
SCHRAMM, C. Henry Jr., Chief Draftsman, A. Box & Co., Inc., Philadelphia
SCHUSSLER, Walter H., Director & Manager, Huttger Manufacturing Co., Philadelphia
SHMIDHEISER, William A., Testing Engineer, Atlantic Refining Co., Philadelphia
SMITH, Frank T., Manager, Engine & Hoist Department, Otis Elevator Co., Pittsburgh
SMITH, Lyman M., Assistant Manager, John Lang Paper Co., Philadelphia
SPANGLER, John I., Assistant to General Manager, Read Machinery Co., York
TAWRESEY, John S., Assistant to Chief Engineer, Engineering Department, Standard Steel & Bearings, Inc., Philadelphia
THOMPSON, J. Cox, Engineer, The United Electric Co., Lemoyne
TOWNSEND, Joseph F., Engineer, The Fuller Engineering Co., Allentown
WALKER, Marcus A., Mechanical Engineer, Hudson Coal Co., Scranton
WATSON, James S., Manager, Drive Chain Department, Link-Belt Co., Nicetown, Philadelphia
WHITNEY, Frank E., Treasurer & General Manager, Commercial Truck Co., Philadelphia
WILLOUGHBY, Alfred B., Owner, St. John Grate Bar Co., Philadelphia

Rhode Island

CARON, Edward H., Beamant & Smith Co., Providence
JOHNSON, Kenneth S., Engineer, Sayles Finishing Plants, Saylesville

South Dakota

BOSMA, Diedrich J., Chief Engineer, Aberdeen Light & Power Co., Aberdeen

Tennessee

BLAKEMAN, Sutherland R., Superintendent, Water & Light Department, Dyersburg
METZ, William R., Mechanical Engineer, Aluminum Company of America, Maryville
SCHILLER, William A., Assistant General Manager, Lucey Manufacturing Corp., Chattanooga

Texas

ASKEW, Miles A., Lubrication Engineer, The Texas Co., Port Arthur
HARDING, Roy C., Apprentice Instructor, G. C. & S. F. Ry. Co., Cleburne
MANN, Oliver, Assistant Master Mechanic, Armour & Co., Fort Worth
USENER, John F., Chief Engineer, Houston Electric Co., Houston

Vermont

HERRICK, Albert A., Designer, Jones & Lamson Machine Co., Springfield
ILLINGSWORTH, George, Mechanical Engineer, Holden-Leonard Co., Bennington
NOWELL, Harold T., Mechanical Superintendent, Central Vermont Railway Co., St. Albans

Virginia

HOYER, Knud, Leading Draftsman, Newport News Shipbuilding & Dry Dock Co., Newport News
SLEEPER, Paul D., Assistant Plant Engineer, Newport News Shipbuilding & Dry Dock Co., Newport News
WHITE, Albert L. Jr., Draftsman, Newport News Shipbuilding & Dry Dock Co., Newport News

Washington

CHASE, Howard W., President & Manager, Colfax Iron Works, Colfax
PARMLEY, Seba M., Designing Draftsman, Pacific Coast Coal Co., Seattle

Wisconsin

BANTA, Herbert D., Chief Engineer, Green Bay Paper & Fibre Co., Green Bay
BURKE, Paul, Chief Engineer, Northwest Engineering Works, Green Bay
CANAN, William D., Assistant Superintendent Engineer, U. S. Army Transport Service, Milwaukee
FEIND, Robert F., Engineer, Allis-Chalmers Manufacturing Co., West Allis
FLANAGAN, Herman C., Sales Engineer, Allis Chalmers Manufacturing Co., Milwaukee
HOFFMANN, Balthasar, President, B. Hoffman Manufacturing Co., Milwaukee
LEUDICKE, Alexander H., Supervising Engineer, Gridley Dairy Co., Milwaukee
NEWHOUSE, Ray C., Engineer, Crushing & Cement Machinery Department, Allis-Chalmers Manufacturing Co., Milwaukee
ORTH, Herbert D., University of Wisconsin, Madison
RODDY, Gustav R., Chief Engineer, Conveying Department, Chain Belt Co., Milwaukee
SPIETH, Benjamin, Instructor, University of Wisconsin, Madison
STONE, Norman S., Engineering Department, Wausau Sulphate Fibre Co., Mosinee
STRAUS, Henry L., Sales Engineer, Cutler-Hammer Manufacturing Co., Milwaukee
WATSON, William, Assistant General Works Manager, Allis-Chalmers Manufacturing Co., West Allis
WHYTE, Robert B., Macwhyte Co., Kenosha

Canada

STUBBS, Wm. Frederick, Combustion Engineer, Imperial Oil Ltd., Sarnia, Ontario
TOLMAN, Clarence M., Electrical Engineer, Moose Mountain, Ltd., Sellwood, Ontario
WHITE, Frank O., Chief Engineer, Brompton Pulp & Paper Co., East Angus, Quebec

Japan

OKA, Masakazu, Sales Engineer, Sale & Fraser, Ltd., Tokyo
SAWAMURA, Nobue, Assistant Engineer of Technical Department of Japanese Navy, Tokyo

South America

BRIGGS, Arthur P., Chief Engineer & Works Manager, Fabrica Tejidos Obregon, Barranquilla, Colombia

Sweden

MENTOR, Ernst, Managing Director, The Swedish Separator Works, Inc., Stockholm

CHANGE OF GRADING

Promotion from Associate

Indiana

HANLEY, William A., Chief Engineer, Eli Lilly & Co., Indianapolis

Promotion from Associate-Member

California

SIMONSON, George M., Chief Electrical Engineer, State of California, Department of Engineering, Sacramento

Connecticut

JOHNSON, Eugene A., Equipment Engineer, Remington Arms Co., Inc., Bridgeport

Illinois

HAY, Earl D., Associate in Engineering, University of Illinois, Urbana
SCHIRMER, Gustav, Sales Engineer, Detroit Office, Whiting Foundry & Equipment Co., Harvey

New York

HAMPSON, Donald A., Engineer, Morgans & Wilcox Manufacturing Co., Middletown
KAELIN, Charles G., Supervisor, Body Tool Development, Pierce-Arrow Car Co., Buffalo
PAUL, John S., Mechanical Engineer, American Brake Shoe & Foundry Co., New York

Ohio

WILCOX, Joseph S. Jr., Chief Draftsman, Parish & Bingham Corp., Cleveland

Pennsylvania

MOORE, Morgan M., Export Sales Manager, Mesta Machine Co., Pittsburgh

Texas

BAUEREISEN, R. J., Captain, U. S. Army, Construction Service, Q.M.C., Camp Travis

Cuba

BROOKS, Henry W., President & Manager, Fabricautes Asociados de Marunaria, Habana

Promotion from Junior

California

FRENCH, Carleton, Sales Engineer, The Worthington Co., Inc., San Francisco

Massachusetts

HORTON, William G., Construction Foreman, General Electric Co., Lynn

Missouri

GALLAWAY, James H., Sales Manager, Kansas City Office, De La Vergne Machine Co., Kansas City

New Jersey

BENCH, Alfred R., Mechanical Engineer, Taylor-Wharton Iron & Steel Co., High Bridge

New York

BAYLIS Roger V., Manager, Engineering Sales, Neptune Meter Co., Long Island City
GALLAHER, Alvan H., Engineer, The Barrett Co., New York
PARKER, Karr, Engineering Manager, McCarthy Bros. & Ford, Buffalo
STONE, Mason A. Jr., Secretary, Engineering & Appraisal Co., Inc., New York
WIEBER, George A., Power Engineer, Utica Gas & Electric Co., Utica

Pennsylvania

HENSHALL, Percival P., Assistant Professor of Machine Shop Practice, Pennsylvania State College, State College
SHUSTER, Myer M., Superintendent, Shuster Engineering Corp., Philadelphia

Wisconsin

SNYDER, Thomas A., Assistant Mechanical Engineer, Bucyrus Co., South Milwaukee

SUMMARY

New Applications	362
Cange of Grading	
Promotion from Associate	1
Promotion from Associate-Member	11
Promotion from Junior	12
Total	386

In Two Sections—Section Two

MECHANICAL ENGINEERING

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A. S. M. E. AFFAIRS

The Secretary's Letter—1920 Annual Meeting—Committee on Education—Doings of Local Societies—A. S. M. E. Representatives on Engineering Council—Professional Sections—Local Sections—Amendments to Constitution—Personals—Necrology—Employment Bulletin—New Members—Candidates for Membership

The Secretary's Letter

Ethics and the Engineering Profession

To practice a profession requires a moral concept, otherwise the activity is a vocation rather than a profession.

The essential characteristic of a profession is that it be of service to others. Popularly, the professions are limited to such activities as those of law, medicine, ministry, architecture, etc.; but essentially, any work may be made professional provided the performance of that work is in the right spirit, namely, that of service to others. At least as long ago as 400 B.C. the medical profession had reduced to writing its moral code under the teaching of Hippocrates. It ought not to be necessary to go into the history of the legal profession and its code in order to demonstrate the essential quality of the concept of the members of that profession; or similarly, to make the point that if we are to have an engineering profession, we must have a code of ethical conduct.

Many of the engineering societies for quite a number of years have had codes, but only in one of the engineering societies does your Secretary happen to know of any penalties having been inflicted for non-observance of the code, or in what constitutes unprofessional conduct. Our Society has had a code which, comparatively recently, has been re-drafted, and there seems now to be a prospect of getting it approved not only by our Society, but also by the other leading national engineering societies, and thus make a step toward establishing a code for the whole profession.

During the war the nation was actuated by the loftiest ideals, and in the main our efforts were patriotic and unselfish. With the conclusion of war there has been a drop in the moral standard throughout the world, and the United States has not been free from such a relapse—but we trust the retrogression here is only temporary. It is inevitable that during this drop in moral standards it is difficult to arouse interest, even among the members of the engineering profession, in the subject of a Code of Ethics.

A man active in the Inter-Church World Movement, just home from a tour of the world, stated recently in a conversation that among all classes of people it is felt the greatest hope for the attainment of the highest ideals lies in the engineering profession. We trust that we may approach the expectations of this world observer.

In the September issue of Mechanical Engineering, the Code of Ethics prepared by our Committee has been reprinted. In a few short, concise and definite sentences this report presents a code of professional conduct that will assist every member in avoiding errors and mistakes. Few of our members realize the importance and tremendous potentialities of this simple code. The proposed Committee on Professional Conduct will form a body which our members can consult when in doubt as to how to meet certain situations. Furthermore, the adoption of this code by the Society and its wide publication will greatly increase its prestige and influence among all our people with the result that membership in the Society and the practice of the profession of engineering will take on a new meaning.

To the degree that the public becomes aware of these self-assumed standards will the movement have social importance.

Public opinion is made up of the opinions of individuals; therefore the contribution which we make toward the acceptance of ethical standards will be in proportion to the individual efforts of every member of the Society. And if the code becomes generally adopted, opinion will likewise be in proportion to the individual contributions by every member of the engineering profession.

Please accept a personal responsibility for the establishment of an Ethical Code, write the Committee,[1] and work for its general acceptance.

Calvin W. Rice,
Secretary.

The 1920 Annual Meeting

Very satisfactory progress is reported in the plans for the 1920 Annual Meeting of the Society to be held in the Engineering Societies Building, New York, December 7-10.

In its selection of Transportation for the subject of the Keynote Session, the Committee on Meetings and Program feels that it has chosen the most important problem in post-war reconstruction. It is planned to subdivide the subject into a consideration of railroads, waterways, motor trucks, and terminals. Under railroads a subdivision will be made of short-line feeders and interurban trolley transportation. Men who will be able to enunciate the principles governing the solution of each of the problems in these subdivisions have been selected by the Committee. The morning of December 9 will be devoted to the subdivisions, and in the afternoon the problem of transportation will be analyzed by a noted expert. This analysis will be followed by an open discussion on all phases of the subject. This entire session will treat with the problems of transportation from the economic as well as engineering point of view, and it is confidently expected that the points brought out at the meeting will be of inestimable value in educating the engineering profession and the public as to the exact requirements for a solution of this so pressing problem.

A number of valuable papers sufficient to make up two general sessions have been received by the Committee. Some of the subjects are—Design of Large Center-Crank Shafts, Calibration of Nozzles, and Strength of Gears.

The subject of Appraisal and Valuation will receive extended

[1] Prof. A. G. Christie, Chairman, Head of Dept. of M. E., Johns Hopkins Univ., Baltimore, Md.

consideration at this meeting. A committee appointed by the President of the Society will go over all of the papers previously presented before the A.S.M.E. on this subject and prepare a résumé for presentation at the session. Additional papers will be procured where necessary in order to round out the subject.

The sub-committee in charge of the Woodworking Session, of which Mr. Thos. D. Perry of Grand Rapids is chairman, has prepared a tentative program which will prove of great value to all those interested in the adaptation of engineering principles to woodworking. As we go to press for this issue, it is impossible to announce the entire list of speakers, but a very interesting session is assured.

Initial sessions will be held by six of the newly formed Professional Sections. The Management Section is to devote its meeting to a consideration of the life and work of Mr. Henry L. Gantt. The Professional Section on Fuels will present four papers whose subjects and authors are as follows: Fuel Supply of World, L. P. Breckenridge; Low-Temperature Distillation of Coal, O. P. Hood; Fuel Conservation versus Money Conservation, D. M. Myers; Relative Cost of Electric Power Generated at Mines and near Point of Consumption (author not yet chosen).

The subjects of the three papers to be presented at the Railroad Section's Session are as follows: Static Adjustment of Trucks on Curves, Increasing the Capacity of Old Locomotives, Modernizing Locomotive Terminals.

The Professional Section on Power is planning a symposium on Centralization of Power. It is proposed to discuss the mechanical phases of the centralized power circuit and the superpower plants to be built in connection with it. The Section on Textiles has presented its program, which it advises is subject to change, but at present covers the following subjects: Textile Fabrics for Mechanical Purposes, Organization of Textile Manufacturing Processes, Ventilation of Dye Houses. The Machine Shop Section will present papers on interesting problems.

A very important and valuable feature of this next Annual Meeting will be the Memorial Session to be held for Past-President Dr. John A. Brashear. A committee of past-presidents of the Society, consisting of Worcester R. Warner, *Chairman*, Ambrose Swasey, Dr. Alex. C. Humphreys, James Hartness and Dr. Ira N. Hollis, will assist in the selection of an orator to prepare and present a tribute to Doctor Brashear which will be worthy of perpetuation as a monument to the wonderful character of the man.

The A.S.M.E. Committee on Education

A meeting of the Committee on Education was held in the Council Room on Friday, September 10. The Committee invited a number of men to assist in a discussion of the duties and opportunities of The American Society of Mechanical Engineers toward the training of men for the industries. Of those invited the following were present: President F. J. Miller, Secretary C. W. Rice, E. S. Carman, E. M. Herr, F. P. Molter, J. C. Dietz, M. W. Alexander, H. B. Shaw, H. B. Sargent, J. P. Monroe.

The Committee consists of: Dr. Ira N. Hollis, *Chairman*, W. W. Nichols, C. R. Richards, C. R. Dooley, P. L. Dougherty, John C. Spence.

President Miller presided over the meeting, which was opened by requesting answers to a number of questions propounded to bring out opinion as to the place of the A.S.M.E. in training all classes for the industries of the country. The consensus was that the Society has a definite duty in this matter of industrial education and that its opportunity is great for service both to its membership and the country. Suggestions brought out covering the future work of the Committee may be classified as follows:

1 That The American Society of Mechanical Engineers, either directly, or through some other agency, collect, classify and report the different systems of education and training for men engaged in the industries.

2 That the Society seek to bring about greater unity of purpose in the training of men by allying itself through committees, or otherwise, with all of the associations formed to promote this important purpose.

3 That a committee be formed to study this question further with the purpose of making it in some form one of its activities.

4 That whatever is collected be published for the benefit of the members of the Society to enable them to do their full share in the training of men for the profession and for labor.

5 That the Society endeavor to establish some kind of a clearing house of information specially for the industries in reference to the training of men.

6 That if possible the Society endeavor to arrange a plan for supplying lecturers from among its members to the corporation schools.

7 That if it is feasible, some elementary textbooks be provided for the apprentices in those industries wherein the Society is especially interested.

It was decided to recommend the formation of a new committee of the Society on Education and Training which would take over all of the educational work of the Society. By formation of subcommittees on relations with colleges, relations with corporation schools, relations with Government schools or commissions, it is believed that the activities of the Society may be unified. The financial requirements of the Committee were given consideration, and it is believed the work to be done could be best accomplished by coöperation with agencies provided with proper funds.

The Committee believes the solution of this important problem of industrial education can be greatly assisted by a whole-hearted interest on the part of the entire membership of the Society and by the offering of services by members who are vitally interested and who can contribute considerable time.

Committee Activities Now Resuming

Though the work of the Society is continuous throughout the year, there is usually a kind of reunion of committee men as soon as the vacation period is over, and a corresponding re-consecration to the work of the organization which naturally reacts favorably to the general development.

These are the days of new ideas, and those who are familiar with the activities know that the Society is getting its share of them, and that many changes, all intended to be in the line of progress, are being suggested.

The new fiscal year of the Society starts on October 1, and this itself is a contributory cause to new development for on this date goes into effect the new budget of estimated income and expenditures for the year.

This budget is now a large one, approaching half a million dollars, and is a measure of the responsibility of the officers and committees, and in fact of all having to do with the administration of the Society.

In addition to the continued and progressive enlargement of our own activities we have endeavored modestly to take our position among the engineering organizations through our joint activities.

Our Society is now an organization of considerable importance and acknowledged influence in the engineering profession. This being accepted, it is important for every member to see in the growing position of the Society, a greater opportunity and responsibility to render service. This is the time of the year to think about these things and to let the Secretary have the benefit of any suggestions which you can make.

Dean Cooley Appointed on Postal Advisory Committee

Dean Mortimer E. Cooley of the University of Michigan, Past-President Am.Soc.M.E., has been appointed a member of the Postal Advisory Committee which is assisting the joint Senate and House Post Office Committee in their investigation of the postal system. It will be necessary for the Advisory Committee to deal with the construction of mail tunnels, tubes, and other mail transportation and handling devices. It is gratifying to have the profession represented and to realize that the Government is becoming alive to the importance of selecting engineers to fill important positions allied with or involving engineering.

DOINGS OF LOCAL SOCIETIES

Cleveland Engineers Invade Detroit

August 28 was a big day in Detroit. Members of the Cleveland Engineering Society, over three hundred strong, invaded the Ford city early in the morning after a memorable night-before boat trip on Lake Erie.

The anticipations of the "Fifth City" members, as they style themselves, were not unwarranted, as the Detroit Engineering Society, as host, had planned a day brim full of good things. The main attraction, and the much advertised one, was an inspection of the Blast Furnace Plant of the Ford Motor Company in all its ramifications. The plant covers an area of some twenty acres and contains much of interest to every type of engineer in its waterway, storage yards, by-product plant and blast furnaces. The by-product plant built by the Semet-Solvay Company is considered one of the cleanest and most up-to-date plants of its kind, and is now in full operation, turning out coke, illuminating gas, light, oil, tar and ammonium sulphate.

After luncheon, where the Cleveland Engineers were guests of the Detroit Society, cars were placed at the disposal of the visitors and numerous pleasure trips were made. Many of the Clevelanders remained over the week end and some extended their stay to the ten-day limit of the trip ticket.

Scientech Club of Indianapolis

The Scientech Club of Indianapolis has been very active throughout the Summer with several meetings and a picnic on September 4. The picnic was reported a great success. (Among the prizes was an illicit still. Angus has it. Prohibition officers take notice.)

At a meeting on September 2 Mr. Calvert gave a talk on Water Filtration. He traced the history of improvement in filtration necessitated by congestion of population. It now consists of sedimentation and of sterilization. An advance in modern methods was made in 1908 when liquid chlorine was introduced to kill bacteria.

At the meeting of September 9 Mr. Weinshank addressed the Club on Heating and Ventilating. The high cost of fuel has made the problem an important one, and no architect now attempts to design without the assistance of a specialist in heating, ventilation, and humidification. The three have become essentials. Humidity has become an important problem because heat applied to cold outside air necessary for ventilation reduces its percentage of moisture, causing catarrhal diseases.

The next meeting is scheduled for September 16 at the local Chamber of Commerce, when the Research Committee will present a resolution relating to theses in scientific school courses.

Engineering Society of Akron

The Engineering Society of Akron, Ohio, had a splendid program for September 14. It announced Seven Speakers in Seventy Minutes. Can it be Done? Here are the speakers:

Dr. D. C. Sowers, Director Akron Bureau of Municipal Research
F. C. Tolles, Superintendent Bureau of Public Works
H. H. Frost, Superintendent Bureau of Water Supply
J. E. Root, Engineer Bureau of Sewerage
E. A. Kemmler, Engineer Bureau of Highways
C. T. Fisher, Engineer Planning Commission
E. A. Zeisloft, Director and Chief Engineer Department of Public Service.

We hazard a guess that Akron's opening meeting established a standard which if maintained during the coming year will provide the engineers in and about that city with a series of worth while engineering talks and discussions.

Pueblo Engineering Association

Members of the Pueblo Engineering Association are endorsing the Colorado Society of Engineers by their membership in the latter organization. In this way they realize that they can continue their local activities and join with the Colorado Society in promoting the interests of the profession throughout the State.

Detroit Engineering Society

The Detroit Engineering Society opened its fall season with a "Smoker" on September 3 in the Board of Commerce. Prof. John C. Parker, in charge of the Electrical Engineering Department of the University of Michigan, gave a talk on The Engineer in Organized Society—What is Hampering His Recognition. At the next meeting on October 17, Mr. Charles Evan Fowler, consulting engineer of New York and Detroit, will give an illustrated talk on Harbors and Harbor Bridges, with particular reference to the proposed Detroit-Windsor Bridge.

The Engineering Society of Buffalo

The Year Book just issued by this organization exemplifies coöperation in a manner most commendable, and the Buffalo Society is to be congratulated upon its grasp of the rather elusive problem of how to get engineers (and particularly engineering organizations) to coöperate.

The booklet contains a concise statement of the history and organization of the Engineering Society of Buffalo and of each of the local sections or chapters of national organizations which are affiliated with it. These include the Buffalo Sections of the American Chemical Society, the American Electrochemical Society, the American Institute of Architects, The American Society of Mechanical Engineers and the Society of Automotive Engineers.

A representative of each affiliated organization holds office on the Board of Directors of the Engineering Society of Buffalo.

The following table, corrected to February 1920, gives the number of members in the Buffalo society and each of the affiliated sections; the second column gives the number in each section who are also members of the society:

	Total	In E. S. B.
Engineering Society of Buffalo	381	..
Affiliated Sections:		
American Electrochemical Society	124	24
American Chemical Society	297	31
American Society of Mechanical Engineers	169	53
American Institute of Architects	55	2
Society of Automotive Engineers	113	17
Total Engineers reached by the E. S. B.	1012	..

A. S. M. E. Representatives on American Engineering Council

The Council has appointed the Society's representatives on the American Engineering Council, the governing body of the newly created Federated American Engineering Societies. The delegates appointed will hold office for two years beginning January 1, 1921, and will also represent the Society at the organization meeting of the American Engineering Council to be held at Washington, D. C., November 18 and 19. Section 2 of this issue contains further details of this organization meeting. The list of representatives appointed follows:

L. P. Alford, formerly editor *Industrial Management*
E. S. Carman, secretary and chief engineer, The Osborn Manufacturing Company, Cleveland, Ohio
R. H. Fernald, professor mechanical engineering, University of Pennsylvania, Philadelphia, Pa.
A. M. Greene, Jr., professor mechanical engineering, Rensselaer Polytechnic Institute, Troy, N. Y.
W. B. Gregory, professor experimental engineering, Tulane University, and irrigation engineer, U. S. Department Agriculture, New Orleans, La.
W. A. Hanley, master mechanic and chief engineer, Eli Lilly & Co., Philadelphia, Pa.
D. S. Kimball, professor industrial engineering, Cornell University, Ithaca, N. Y.
Charles T. Main, consulting engineer, Boston, Mass.
Fred J. Miller, president of A.S.M.E., 1920
L. C. Nordmeyer, secretary and treasurer, Tait and Nordmeyer Engineering Company, St. Louis, Mo.
V. M. Palmer, engineer of industrial economy, Eastman Kodak Co., Rochester, N. Y.

H. P. PORTER, superintendent gas department, Gypsy Oil Company, Tulsa, Okla.

ARTHUR L. RICE, managing editor *Power Plant Engineering*, Chicago, Ill.

PAUL WRIGHT, engineer and contractor, Paul Wright & Company, Birmingham, Ala.

Management Section Elects Officers

A letter ballot recently taken for the purpose of selecting officers for the Management Section has resulted as follows:

Chairman	L. P. Alford
Vice-Chairman	L. W. Wallace
Executive Committee	Frank B. Gilbreth
	C. E. Knoeppel
	S. E. Thompson
Secretary	W. H. Greul

Power Section

Under the heading Professional Sections last month, an error was made in the announcement of the officers of the Power Section. The officers of the Section are as follows: *Executive Committee:* A. D. Bailey, *Chairman;* A. G. Christie, *Vice-Chairman;* L. S. Marks, W. B. Gregory, and T. E. Murray; *Secretary,* C. W. Wilder.

Aeronautic Section Organizes

The organization meeting of the Aeronautic Section was held in the rooms of the Detroit Athletic Club on September 27. An organizing committee was nominated to prepare a ballot for the election of the Executive Committee. Visits were made to various manufacturing institutions engaged in aeronautical development. A full account of the meeting will be published in a later issue of MECHANICAL ENGINEERING.

The Transactions

An unusual opportunity, which probably cannot again be duplicated, is offered to secure certain issues of Transactions, of which the Society has a few copies remaining, at prices far below present day cost.

These volumes of Transactions contain the most valuable papers which have been presented before the Society in the different years which they cover, and constitute reference works of inestimable value to engineers upon an unusually wide range of subjects.

Full information and prices will be sent upon request.

There is also an opportunity for new members, elected to membership since January first, 1920, to secure copies of the current volume of Transactions which is about to be distributed to the membership. Under its constitution the Society cannot furnish, gratis, to new members copies of Transactions for the year of election. In order that these new members may begin their set of volumes this year, however, the Society has printed additional volumes, which are offered *to new members this year only* at the special price of $4.00 a copy.

Local Sections Active

Plans for Season Well Under Way in Forty-two Cities. Forty Simultaneous Meetings Planned for Friday, November 5, in Celebration of the First Annual Meeting of the Society Held November 4–5, 1880

GREAT interest is manifest among the various executive committees of the Local Sections in the plan to hold forty simultaneous meetings in celebration of the first regular meeting of the Society held 40 years ago. A number of the officers of the Society and committee-men of the Professional Sections have promised their support in making this proposed celebration a success.

The suggested program provides certain uniform features, with sufficient leeway to take care of local requirements. The tentative program under consideration is about as follows:

1 Trips of inspection during the afternoon
2 Subscription dinner, arranged in such a way that those who do not wish to participate at the dinner can attend the meeting to be held afterward
3 Address of welcome by the mayor or some prominent engineer or citizen in each locality
4 A fifteen-minute address in each locality by an officer of the Society. Drawing from the members of Council, Chairmen of Standing Committees and living Past-Presidents of the Society, there are just about forty representative officers available to provide one at each of the meetings
5 A technical address in each city. These addresses would, of course, be different, and due to the importance of these meetings, it should be possible to get speakers and papers of the

Coming Section Meetings

Buffalo.

October 26. In Auditorium of the University Club at 8:15 P.M. Speaker: Mr. S. T. Dodd, General Electric Company, his subject being Steam Railroad Electrification, the paper to be illustrated by Lantern Slides.

Cleveland.

October 5. At Cleveland Engineering Society Rooms. Speaker: E. C. Peck of Cleveland Twist Drill Company. Subject: Relation to the Industry of the National Screw Thread Commission's Report.

Colorado.

October 29. At Metropole Hotel, Denver, Colorado.

Mid-Continent.

October 14-15-16. Joint Meeting of the Mid-Continent and Houston Sections at Dallas.

New York City.

October 22. At Engineering Societies Building. Subject: Steam vs. Electric Railroads. Several speakers of prominence. Joint Meeting of the New York Section, A. I. E. E., Professional Section on Railroads, A.S.M.E. and Metropolitan Section, A.S.M.E.

Philadelphia.

October 26. At the Engineers' Club. Speaker: Albert Kingsbury of Pittsburgh. Subject: "Bearings."

Providence.

October 5. At Providence Engineering Society Rooms. Subject: On Management.
October 19. General Society Meeting.

Washington State.

October 1. At the Engineers' Club. Speaker: Prof. H. V. Carpenter of State College of Washington. Subject: Thermal Conservation.

very best type. This feature of the program should not take over forty-five minutes.

6 A half hour might also be devoted to entertainment features and refreshments at the closing.

Members in each city where one of the simultaneous meetings will be held will receive further information from the executive committee of the Local Sections as soon as the arrangements are completed.

General Notes

Several Local Sections have completed their programs for the season, including dates, subjects, and in some cases have also obtained speakers.

Joint meetings with other national and local Engineering societies and with the A.S.M.E. Professional Sections are being arranged in a number of places.

Altogether the promise of a real, live successful season is better at this early date than ever before in the history of the Society, and it is hoped that *every* member will enter into the spirit of the times and contribute (at least by his attendance at meetings) to the success of the work which is being done for the advancement of the best interests and the highest ideals of the engineering profession.

The American Society of Civil Engineers held a meeting on Wednesday, September 15, to which a special invitation to attend was given to members of The American Society of Mechanical Engineers. The Speaker of the evening was Mr. John R. Freeman, Past-President of our Society and a member of the A. S. C. E. His subject was Recent Engineering Developments in China and the Far East. Mr. Freeman illustrated his lecture with a number of beautifully hand-painted lantern slides. A large group of members of the Society residents in the Metropolitan Section showed their appreciation of the spirit of coöperation of our sister Societies by their attendance. The Metropolitan Section hopes to have several meetings with the other sister engineering and technical societies in the district during the coming year.

A more detailed account of Mr. Freeman's talk will be found on page 593 of Part One of this issue.

Recent Section Meetings

Connecticut:

New Haven Branch:

September 8. Business meeting was held. Committee on Meetings appointed.

Meriden Branch:

September 8. Business meeting was held at "The Home Club." Committees appointed.

Philadelphia:

September 28. Outing at McCall Field, Highland Park. Brief address by Dr. Rosa of Washington.

Constitutional Amendments Mailed to Membership

Two amendments to the Constitution were presented at the Spring Meeting in St. Louis this year, and as required by the Constitution, are being mailed this month to all members of the Society entitled to vote, in accordance with the requirements of the Constitution.

The first of these is to extend the privilege of voting to include Junior members. It was presented by Mr. Morris L. Cooke on the argument that in all business, religious or social organizations, a man secures all his privileges and assumes all his responsibilities by the time he is twenty-one years old, and that in other professional societies, such as those of doctors, lawyers and architects, membership implies full privileges. Mr. Cooke made an analysis and found that over 75 per cent of our present Juniors are graduates of colleges or technical schools. The average age of those now Juniors was over 25 years at the time they joined the Society. Their present average age is nearly 29 years, and both the median and nodal ages are over 27 years. Only 23 per cent of our members are juniors, and of these only 8 per cent are below 27 years, at which age associates vote.

He considers that the practice would influence graduate engineers to join the Society on graduation as a logical next step in the development of their professional status, and of even greater importance it would get our younger men into the habit of active and full participation in Society affairs.

Mr. Cooke's amendment is:

Present Form	Proposed Amendment
C-6. The membership of the Society shall consist of Honorary Members, Members, Associates, Associate Members, and Juniors. Honorary Members, Members, Associates and Associate-Members are entitled to vote and to hold office. Juniors are not entitled to vote nor to hold office, but are entitled to all the other privileges of membership.	C-6. The membership of the Society shall consist of Honorary Members, Members, Associates, Associate-Members, and Juniors.
C-7. Honorary Members, Members, Associates and Associate-Members are entitled to vote on all questions before any meeting of the Society, in person, or by a proxy given to a person entitled to vote. A proxy shall not be valid for a greater time than for six months.	C-7. Honorary Members, Members, Associates, Associate-Members, *and Juniors* are entitled to vote on all questions before any meeting of the Society, in person, or by a proxy given to a person entitled to vote. A proxy shall not be valid for a greater time than for six months.

The second amendment was proposed by President Miller, and its principal objects are to virtually make the matter of proposing an amendment to the Constitution a little more formal by calling for the signatures of twenty members, and secondly to shorten the time required to put through an amendment to the Constitution from one year to two general meetings, which would average six months.

President Miller's amendment is as follows:

Present Form	Proposed Amendment
C-57. At any Semi-Annual Meeting of the Society any person entitled to vote may propose in writing an amendment to this Constitution. Such proposed amendment shall not be voted at that meeting but shall be open to discussion and such modification as may be accepted by the proposed. The proposed amendment shall be mailed in printed form by the Secretary to each person entitled to vote, at least sixty days previous to the next Annual Meeting, accompanied by comment by the Council, if it so elects. At that Annual Meeting such proposed amendments shall be presented for discussion and final amendment and shall subsequently be submitted to all persons entitled to vote, provided that twenty votes are cast in favor of such submission. The final vote on adoption shall be by sealed letter ballot, closing at 12 o'clock noon on the first Monday of March following.	C-57. At any *General* Meeting of the Society any person entitled to vote may propose in writing an amendment to this Constitution, *provided that the proposer shall have secured the written signature of at least twenty members approving the proposed amendment.* Such proposed amendment shall not be voted on at that meeting but shall be open to discussion and to such modification as may be accepted by the proposer. *If the proposed amendment as originally written or as changed or modified with the consent of the proposer is again indorsed by twenty or more members, who may or may not be the original indorsers,* it shall be mailed in printed form by the Secretary to each person entitled to vote, at least sixty days previous to the next *General* Meeting, accompanied by comment of the Council, if it so elects. *Ballots shall be sent with the proposed amendment. The voting shall be by sealed ballot and the voting shall close at noon of the first day of the General Meeting following the mailing.*
C-58. The letter-ballot accompanied by the text of the proposed amendment, shall be mailed by the Secretary to each person entitled to vote, at least thirty days previous to the closure of the voting. The ballot shall be voted, canvassed, and announced as provided in the By-Laws. The adoption of the amendment shall be decided by a majority of the votes cast. An amendment shall take effect on the announcement of its adoption by the Presiding Officer of the Semi-Annual Meeting next following the closure of the vote. Any changes in the order or consecutive numbering of existing articles of the Constitution made necessary by such adopted amendment, shall be made under the direction of the Council.	C-58. The ballots shall be voted, canvassed and announced as provided in the By-Laws. The adoption of the amendment shall be decided by a majority of the votes cast. An amendment shall take effect on the announcement of its adoption by the Presiding Officer at the same General Meeting. Any changes in the order or consecutive numbering of existing articles of the Constitution made necessary by such adopted amendment, shall be made under the direction of the Council.

Both these amendments will come up for discussion and final amendment at the Annual Meeting in December, and will subsequently be submitted for ballot to all members entitled to vote and the ballot canvassed and announced at the Spring Meeting in Chicago in 1921.

PERSONALS

Newman Comfort has resigned his position of manager of the Maryland branch, National Workmen's Compensation Service Bureau, to accept a position with the Maryland Casualty Company, as manager of the Casualty department in their Chicago branch office.

Raymond A. Cole has severed his connection with the Hayes Wheel Company, where he was employed as efficiency engineer, and has accepted a position of similar nature with the Motor Wheel Corporation, Lansing, Mich.

Arthur A. Merry, formerly production manager, Pratt & Whitney Co., Hartford, Conn., has accepted a similar position with the General Fuel Saving Corporation of Rochester, N. Y.

C. William Bayne, industrial engineer, formerly with the Ford Motor Company, and Timken Detroit-Axle Company, of Detroit, Mich., is now production manager for the F. C. Austin Machinery Corporation, Muskegon, Mich.

O. L. Merkt, who has been associated for the past 15 years with Westinghouse, Church, Kerr & Company, New York, has resigned and is now connected with the American Can Company, in the capacity of assistant chief engineer, with headquarters in New York, N. Y.

O. L. McIntyre has been transferred from the home office of the Fuller Engineering Co., Allentown, Pa., to Milwaukee, Wis., to superintend the erection of a 1000-ton per day pulverized coal installation at the Lakeside Power Plant of the Milwaukee Electric Ry. and Light Co., for which the Fuller Engineering Co. has the contract.

C. B. Lord has assumed the duties of works manager for the Advance-Rumely Company at Battle Creek, Mich.

F. W. Dean, formerly mill engineer and architect of Boston, and for nearly three years in war work for the United States Shipping Board Emergency Fleet Corporation, in charge of the steamship boiler department, and testing of boilers, has resigned his position. Mr. Dean has become associated with L. N. Wheelock and J. C. Bogue, formerly the firm of the Wheelock-Bogue Co., Boston, under the firm name of Wheelock, Dean and Bogue, Inc., which organization will be the New England agent for the Erie City Iron Works, of Erie, Pa., and of several other companies. The offices of the new organization are in Boston, Mass.

R. Laurence Weldon has recently left the engineering department of The Laurentide Company of Grand Mère, Que., to join the Fort Frances Pulp and Paper Company of Fort Frances, Ontario, as resident engineer in charge of engineering and construction work.

A. G. Christie, chairman Code of Ethics Committee of this Society and a member of the Publications Committee, formerly associate professor of mechanical engineering, Johns Hopkins University, Baltimore, Md., has been appointed professor of mechanical engineering of the Night Technical Schools of Johns Hopkins University.

C. C. Thomas, formerly professor of mechanical engineering, Johns Hopkins University, Baltimore, Md., has opened a consulting engineering office in Los Angeles, Cal.

C. H. Vickers is now designer and draftsman with Moore Steam Turbine Corporation of Wellsville, N. Y. He was formerly with the Walworth Manufacturing Company, Kewanee, Wis.

F. Van Buren Connell has accepted a postion as sales engineer for the Automatic Fuel Saving Company of Philadelphia, Pa.

J. R. Lowe has been transferred from the New Orleans to the Anderson, Ind., Plant of the Midwest Engine Company. He is sales engineer for the Hill Pump Works Division.

R. E. Chandler has resigned his position as professor of mechanical engineering at the University of Florida to accept a similar position at the University of Idaho, Moscow, Idaho.

Edward G. Jay, Jr., who has been Hull Fittings Engineer in charge of design and specifications for ships building by the American International Ship Building Corporation at Hog Island, has completed that work and has been appointed executive engineer on the staff of the senior vice-president.

Elias Schlank, formerly assistant mechanical superintendent for Julius Kayser Co., Brooklyn, N. Y., is now located in Newark, N. J., as a consultant factory engineer.

Jay Carrol Wheeler, who has been associated with Kerr Turbine Co. as construction engineer for the past ten years, has resigned to become construction engineer for the C. H. Wheeler Manufacturing Co. of Philadelphia, Pa.

Leland H. Smith, formerly secretary and treasurer for the Independent Oil Co., Decatur, Ill., is now coördinator for the Power Laundry Coöperation Course, Ohio Mechanics Institute, Cincinnati, Ohio.

Harry T. Harmon is now transmission engineer for the Hyatt Roller Bearing Division, General Motors Corporation, Newark, N. J.

Richard Grosholz is now with the Bodenhausan Co., Cornwells, Pa., having completed his work as estimator for the N. Y. Shipbuilding Corporation, Camden, N. J.

C. B. Cole has resigned his position as manager of the Chicago store of the Union Twist Drill Co. and will become general sales manager of the W. L. Romaine Machinery Co., Chicago, Ill.

Richard H. Mulliner, formerly with The Porter-Cable Machine Co., is now associated in business with Mulliner Brothers of Syracuse.

Herman B. Scharnberg has resigned his position with the Haitian American Corporation and has taken the position of chief engineer with the Palma Sugar Co., Central Palma, Oriente, Cuba.

Edward J. Fisher, formerly industrial management engineer, Columbia Graphophone Manufacturing Co., Bridgeport, Conn., is now factory manager, U. S. Auto Gear Shift Co., Eau Claire, Wis.

Clayton O. Smith, formerly sales manager, Norton Grinding Co., Worcester, Mass., is now treasurer and general manager of the O. S. Walker Company of Worcester.

Irving C. Baker is now plant engineer for the Maryland Motors Corporation, Laurel, Md.

Harvey J. Powell, formerly student engineer, Turbine Research Station, General Electric Company, Lynn, Mass., is now employed as mechanical draftsman by the Newport News Shipbuilding and Dry Dock Company, Newport News, Va.

G. B. Rice has resigned as assistant works manager, Merchant Shipbuilding Corporation, Harriman, Pa., and accepted a position with T. Shriver & Company, Harrison, N. J.

Herbert Higginbottom, Jr., is now associated with the Arthur Knapp Engineering Corporation as assistant engineer in its Detroit office. He was formerly tool and gage designer of the Packard Motor Car Company.

J. Inman Emery, formerly manager Messrs. Vickers, Ltd., Ordnance Factory, Erith, Kent, England, is now with The Austin Motor Co., Ltd., Longbridge Works, Birmingham, England.

John T. Arkison, formerly general manager Arkison & Smith Co., Bridgeport, Conn., is now superintendent of the plumbing and heating department for D. K. Allen, Greenwich, Conn.

George R. Woods, who has been manager of the New York office of R. S. Stokvis & Zonen, Ltd., is now president of Alliance Transportation Co., Inc., of New York.

J. H. Figée has severed his connection as engineer with the Steere Engineering Company of Detroit and is now affiliated with the Ford Motor Company in the Rouge Plant at Dearborn, Mich.

J. L. Looney, formerly mechanical engineer, Globe Machinery & Supply Co., Des Moines, Ia., is now employed by Miller, Franklin, Basset & Co., of New York.

Felix J. Wasilkowski announces change of position from experimental engineer of Tottle & Bailey's Manufacturing Company, to the Empire Art Metal Company, Inc., College Point, N Y., in a capacity of assistant to works manager. His duties will consist of designing machinery, tools and general factory equipment, also general safety engineering work and all order data pertaining to the mechanical division.

E. W. Blue, formerly Scovell, Wellington & Co., Boston, Mass., is now in the mechanical department of the Case School of Applied Science, Cleveland, Ohio.

Arthur L. Brown is now in the office of superintendent, Lincoln Motor Co., Detroit, Mich., having given up his former position with the Small Arms Division, Ordnance Office, U. S. A.

Wallace J. Cross, formerly with The Island Refining Corporation, New Orleans, La., is now construction engineer, Pierce Oil Corporation, Fort Worth, Texas.

George B. Malone, general manager of the K. G. Welding & Cutting Co., New York City, has recently taken charge of the Philadelphia office of the Company.

Charles A. Stolberg, while in army Major, Ordnance Dept., U. S. A., is now engaged in industrial brokerage in Canton, Ohio, dealing in real estate and investments.

The Clark-Mesker Company has recently been incorporated for the purpose of taking over the Machine Tool Department of The Cleveland Milling Machine Company. D. B. Clark, president, is also general manager of The Cleveland Planer Company and The Cleveland Machine Tool Company, was formerly superintendent of Watervliet Arsenal during the war, and is a well-known factor in the machine tool industry. L. H. Mesker, vice-president and general manager, has been in machine tool business for a good many years. He

was formerly connected with Motch & Merryweather Machinery Company, Manning, Maxwell & Moore, Inc., and more recently with Kearney & Trecker of Milwaukee.

LOUIS SEUTTER has resigned his position as assistant engineer with the U. S. Forest Products Laboratory, Madison, Wis., and is now associated with W. H. Coye, Counsel for the furniture industry, Grand Rapids, Mich.

I. A. BAUM, formerly assistant general manager for the La Salle Engineering Company of Chicago, Ill., will in the future have only an inactive interest in the La Salle Engineering Company. Mr. Baum is now vice-president of the American Rotary Engineer Company, Grand Rapids, Wis.

S. C. SHIPLEY has severed his connection with the University of Minnesota and has become associated with Robert College, Constantinople, as professor of mechanical engineering.

CHARLES A. SIPE, formerly with The Aluminum Rolling Mill Company, Cleveland, Ohio, now has charge of efficiency work at the U. S. Aluminum Co., Maryville, Tenn.

N. E. HILDRETH has resigned as superintendent of the Cushman Motor Works, Lincoln, Neb. and has become works manager of the Witte Engine Works, Kansas City, Mo.

WM. E. LAWRENCE has been transferred from the Marlin-Rockwell Corporation, New Haven, Conn. to the Standard Steel and Bearing Company's Division at Plainville, Conn., as supervisor of the gage department.

WALTER C. LANGE has resigned his position as engineer with the Hammel Oil Burning Equipment Co. and now holds a similar position with The Howard Moore Company of New York City.

CHARLES S. DAHLQUIST has resigned his position as chief engineer of the Timken-Detroit Axle Company, Detroit, Mich., to become director of engineering of The Eaton Axle Company, the Axle Division of the Standard Parts Company, Cleveland, Ohio.

R. A. WURGEL has resigned as inspecting engineer for the Foamite Firefoam Company to become associated with the Oil Insurance Association as fire protection engineer and special agent in fire insurance rating, operating in the Mid-Continental oil fields.

A. W. HUSEBY, formerly chief engineer, Armour Mechanical Co., U. S. Yards, Chicago, Ill., is now in the master mechanic's office of Morros & Company, Chicago, Ill.

GEORGE H. COOPER has severed connections with the H. T. Paiste Co. of Philadelphia, Pa., where he was mechanical superintendent, and is now superintendent of the Merit Machine Manufacturing Corporation of New York.

RALPH W. FANNON has resigned his position as chemical engineer with the Wausau Sulphate Fibre Co., Mosinee, Wis., and is now connected with the Management Engineering and Development Co. of Dayton, Ohio.

B. G. WELCHANS, formerly general superintendent of the Stanley G. Flagg Company, Pottstown, Pa., is now plant manager for the Detroit Valve and Fittings Company, Wyandotte, Mich.

JAMES C. RYDER is now chief engineer for the Zieley Syndicate of New York.

HARRY N. BECKER is now connected with The Pyrites Company, Ltd., Wilmington, Del.

M. P. MATTHIAS, who is with the Foamite Firefoam Company, has been transferred from Richmond, Va. to New York City.

HOWARD W. AUMACK, formerly assistant production manager of the Slocum, Auram, Slocum Laboratories of Newark, is now in the engineering department of The Intertype Corporation of Brooklyn, N. Y.

Among the newly elected officers of the Illuminating Engineering Society, who will assume office in October, are General GEORGE H. HARRIES and SAMUEL E. DOANE. General Harries has been prominent in the electrical field for over twenty-five years, engaging in electrical engineering and construction, especially in public utility work, and holding important offices in various electrical societies and companies. Mr. Doane, also well-known in the electrical field, has specialized in standardization work, one of his papers on this work being instrumental in the establishment of the Bureau of Standards. General Harries, as new president of the Illuminating Engineering Society, and Mr. Doane, as junior past-president, will both serve on the Council of the Society for the coming year.

WILLARD L. CASE, consulting engineer for the Willard Case & Co. of New York, has been elected treasurer of the Yale & Towne Manufacturing Company, Stamford, Conn.

EUGENE SZEPESI, formerly senior engineer for the Cooley & Marvin Company, Boston, Mass., has organized the Szepesi Industrial Organization to render professional service to manufacturers on industrial engineering and industrial economics.

W. N. DICKINSON has been elected president of the New York Electrical Society to succeed Edwin B. Katte. Mr. Dickinson is a consulting engineer and has been associated with several elevator companies, principally the Otis Elevator Company. During the war he was engaged in war work at Washington.

LEWIS E. SUMMERS has accepted a position with the Keller Pneumatic Tool Co., as works manager of the Grand Haven, Mich., plant.

WALTER RAUTENSTRAUCH, professor of mechanical engineering, Columbia University, has recently joined the J. C. White organizations as vice-president of The Management Corporation, in charge of industrial properties.

An announcement in the August issue of MECHANICAL ENGINEERING of the enlargement of the Charles T. Main organization named Mr. Gunby and Mr. Cole as associates of Mr. Main. Other members of the Society who are also associated with this organization are WILLIAM FRANK UHL, as hydraulic engineer, and CHARLES R. MAIN, as special assistant.

LOUIS H. BLOOD has resigned as chief engineer of The Oesterlein Machine Co., and has opened an office in Cincinnati as designing engineer, specializing on the design of standard and special machine tools.

WM. G. R. BRAEMER, who is erroneously listed in the 1920 Year Book as president of the Braemer Air Conditioning Corporation of Philadelphia, Pa., is a member of the Braemer Engineering Company, consulting engineers and specialists in air conditioning and drying, Philadelphia and Baltimore.

C. W. WILLETTE, after many years of investigation and study of the requirements on the Pacific Coast, has brought out an entirely new type of saw-mill machinery, and has concluded a contract with the Puget Sound Machinery Depot, of Seattle, Wash., for the manufacture of this machinery, in connection with their own, under his personal supervision as chief engineer of the Milling Department. Mr. Willette is located in Portland, Ore.

CHARLES EISLER, an expert incandescent lamp equipment engineer, has entered the consulting engineering field, and is now devoting his time to designing and developing special and automatic machines for the manufacture of standard, miniature and gas filled lamps. The organization will also maintain a well equipped department for manufacturing wire product used in the incandescent lamps, for which now the very latest machines are being developed and installed.

WALLACE E. TILLINGHAST, managing owner, Massachusetts Steam Specialty Company, will be in direct control and supervision of the department of diplomatic and advisory engineering which that company has recently organized.

WILLIAM D. ENNIS announces his resignation as professor of mechanical and marine engineering in the Postgraduate School of the U. S. Naval Academy to become vice-president of the Technical Advisory Corporation of New York. Mr. Ennis has been associated with the latter corporation since its organization and will hereafter be located at its general offices in New York City.

GERARDO IMMEDIATO has been appointed professor in charge of machine and power-plant design at the Polytechnic Institute of Brooklyn.

MILTON C. STUART, formerly senior mechanical engineer at U. S. Naval Engineering Experiment Station, Annapolis, Md., has been appointed professor of mechanical and marine engineering at the Naval Postgraduate School, Annapolis, Md.

A. A. POTTER has resigned his position as dean of engineering at the Kansas State Agricultural College to accept a similar position at Purdue University, Lafayette, Ind.

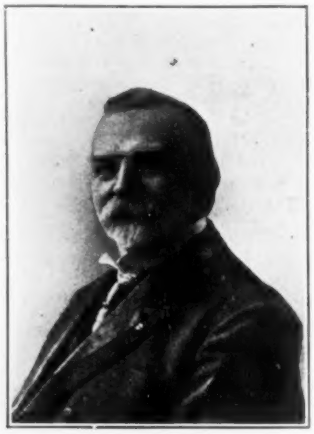
E. A. HITCHCOCK, formerly vice-president of the Bailey Meter Company of Cleveland, Ohio, is returning to Ohio State University at Columbus, Ohio, where he spent several years. He has been appointed dean of the Engineering College.

The Combustion Engineering Corporation announces the appointment of HENRY KREISINGER, formerly of U. S. Bureau of Mines, as engineer of research. Mr. Kreisinger will conduct investigations for the Combustion Engineering Corporation of a similar nature to those that he conducted for the Government; and the results of his work will be available to the Government as well as to the clients of the Corporation. He will make his headquarters at the Bureau of Mines Station at Pittsburgh. The first problem which he will consider will be a thorough testing of the powdered-coal plant of the Bureau of Mines at Milwaukee, Wis.

NECROLOGY

WILLIAM M. BARR

William M. Barr, who joined the Society in the year of its foundation, 1880, died on July 27, 1920. Mr. Barr was born in November 1842, in Muncy, Pa. He received the degree of mechanical engineering to which profession he devoted his life. Mr. Barr served in the Navy throughout the Spanish and Civil Wars. He is well known



William M. Barr

in the world of technical literature for his works on Pumping Machinery, Boilers and Furnaces, Combustion of Coal, etc. His chief work is Barr's Industrial Engineering, a Handbook of Useful Information for managers, engineers, superintendents, designers, draftsmen and others engaged in constructive work, Part I of which was recently issued. Part II is in preparation for early publication.

Mr. Barr was also a member of the American Society of Naval Engineers.

SAMUEL H. EDWARDS

Samuel H. Edwards, manager of the Tide Water Oil Co., Bayonne, N. J., died on August 4, 1920, of heart trouble. Mr. Edwards was born in Pottsville, Pa., on January 12, 1858. He was educated in the grammar schools of Albany, N. Y., and at an early age started work for his father, who was a pioneer oil refiner in that city. He later went to Williamsport, Pa., where a refinery was erected of which his father was superintendent.

Mr. Edwards was in the service of the Tide Water Oil Company interests for 38 years. He entered the employ of the Chester Oil Company in 1882, and was sent to take charge of the can and case department of Lombard, Ayres & Company at Bayonne, N. J., in 1888. Later that same year the Chester Oil Co., the Lombard Ayres Co., and several other oil companies were merged in one under the name of Tide Water Oil Company. In 1890 he was sent to superintend the erection and operation of the iron-ore mines for the Benson Mines Company, New York. In 1897 he returned to the Tide Water Refinery as mechanical superintendent. In 1901 he was sent to superintend the shipyard of Townsend and Downey Shipbuilding Company at Shooters Island, N. Y. In 1903 he again returned to the Tide Water Refinery resuming the position of mechanical superintendent. In 1906 he started the building of oil-pipe lines and pump stations for the Tide Water Pipe Company from Bradford, Pa., to Stoy, Ill. He finished this work in 1909, returning to the Refinery at Bayonne. Upon the death of his brother Frank W. Edwards in 1911, he was appointed general superintendent of the Bayonne Plant, being advanced in 1917 to position of manager. He was also a member of the Board of Directors of the Company.

Mr. Edwards became a member of the Society in 1912. He belonged to a number of clubs and was interested in the civic affairs of Bayonne.

JOSEPH W. HARTMAN

Joseph W. Hartman was born in Lyons, N. Y., on April 8, 1890. He received his education at the Lyons Union School and was graduated in 1912. He then entered Rensselaer Polytechnic Institute, from which he received his M. E. degree in 1916. His first professional work was with the Cambrai Steel Co. at Johnstown, Pa., where he spent one year. He was with the Corning Cut Glass Co. for three years and in May, 1920, entered the employ of the Gleason Works, Rochester, N. Y., where he was located at the time of his death.

Mr. Hartman, who became a junior member of the Society in 1917, met death very suddenly by drowning in Sodus Bay, N. Y., on July 3, 1920.

JAMES AMORY HERRICK

James A. Herrick, who died at Merrimack, N. H., on September 10, 1920, was born in Nashua, N. H., on January 17, 1850. Mr. Herrick was educated in Boston schools and attended the Massachusetts Institute of Technology, from which he was graduated in 1872. The following year he took a post-graduate course.

His first work was with the former Nashua Iron & Steel Co., as chemist. Later he had charge there of the production of steel. In this connection he used the first Siemmens gas producer, imported from England in 1866, employing the principle of the direct gasification of coal for fuel to melt the steel. Later he went to Pittsburgh, Pa., and for a number of years was engaged in similar lines of work in the steel industry of that city.

He became greatly interested in the possibilities of gas made directly from coal for fuel purposes, and entered this field on his own account in 1886, in which he continued until 1918, when he retired from active business. Mr. Merrick was a prolific inventor in his chosen work, having taken out about forty patents, besides many foreign ones. He was rated as the dean of the producer-gas business in this country and had installed many important fuel and power plants, using producer gas for fuel.

Mr. Herrick was one of the earliest members of the Society, joining in the year of its foundation, 1880.

HOMER N. MOTSINGER

Homer N. Motsinger, industrial and mechanical engineer, Chicago, died on August 13, 1920. Mr. Motsinger was born on March 16, 1875, in Pendleton, Ind. He received his early education in the schools of Shoals, Ind., and later he entered Purdue University where for three years he studied electrical engineering. From 1900 to 1916 Mr. Motsinger was vice-president and general manager of the Motsinger Device Manufacturing Co. At the close of that period he entered professional engineering work in which he was engaged for two years when he became works manager of the U. S. Ball Bearing Manufacturing Co. in charge of all production and design of special machines and tools. Early in 1920 Mr. Motsinger opened consulting offices in Chicago, and was actively interested in this field of work at the time of his death.

Mr. Motsinger became a member of the Society in 1919. He was also a member of the Society of Automotive Engineers and a charter member of the Society of Industrial Engineers. He was much interested in and belonged to several fraternal organizations.

ALBERT ROBOSSON SHIPLEY

Albert R. Shipley, production superintendent of Old Line Products, died on February 15, 1920. Mr. Shipley was born on April 20, 1876, in Alpha, Md. He attended school in Baltimore and was graduated from both the McDonough and the Maryland Institutes of that city. He was a machinist with the Tabor Manufacturing Co., Philadelphia, at the time that Frederick W. Taylor was successfully working out in practice there the principles of his system of scientific management. His association with Mr. Taylor continued over seven years.

After serving the New England Butt Co., the Seth Thomas Clock Co. and the Sentinel Manufacturing Co. in industrial engineering and executive capacities, he was called by the Government in August, 1916, to become superintendent of production at the Watertown Arsenal. In January, 1918, Mr. Shipley joined the industrial engineering department of the Winchester Repeating Arms Co. and remained with that department until his appointment in October to Old Line Products department of the company.

Mr. Shipley became an associate of the Society in 1912. He was also a member of the Taylor Society and belonged to several fraternal organizations. He frequently lectured on scientific management in which he was regarded as an authority in view of his work under the immediate direction of Mr. Taylor.

OROSCO CHARLES WOOLSON

Orosco C. Woolson, designing engineer and manufacturer, New York City, died on July 2, 1920, of heart failure. Mr. Woolson was born in Cuba on May 14, 1848. He received his early education at private schools in Massachusetts and later attended the Worcester Military Academy. From 1865 to 1869 he served an apprenticeship with the Hewes & Phillips Iron Works, Newark, N. J. He was associated for short periods with the John Cooper Engineering Works, Mt. Vernon, Ohio, as draftsman; the United States Government as draftsman on the Emery testing machines; the New York Elevated Railroad as inspector of construction; the Babcock & Wilcox Co. as draftsman, and the National Water Tube Boiler Co. as manager.

In 1893 Mr. Woolson established an engineering business in New York City specializing in designing and construction of combustion apparatus, power-boiler equipment and furnace accessories. At the time of his death he was also eastern representative of the Automatic Furnace Co., Dayton, Ohio.

Mr. Woolson became a member of the Society in 1886. He was also a member of the New York Railroad Club and the Board of Trade, Newark, N. J

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and a pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

MANUFACTURING EXPERT with 12 to 15 years' experience on quantity production of small interchangeable parts. Must be familiar with construction and operation of commercial manufacturing machinery, and capable of designing special process machinery. Location Middle West. Z-243.

SUPERINTENDENT; factory in New England manufacturing small machinists' tools, at present employing about 200, but with excellent prospects for increase, has position for superintendent, who is anxious to firmly and permanently establish himself and who has ability to eventually assume full charge of manufacturing end of business. Requirements: familiarity with production of similarly accurate small pieces of high quality; proven ability in handling employees; proven ability in mechanical lines with reference to standard and special machinery for efficiently doing work. When applying give full information and especially full detailed record of past employment. Z-394.

MACHINE DESIGNERS to go ahead and design machines from ground up when furnished with necessary data on requirements. Would be called upon to design fine tool machines. Location Mass. Z-424.

CHIEF DRAFTSMAN for industrial layout and general office work. Location New York City. Z-434.

DESIGNER experienced in making working drawings for work on portable life-saving apparatus, similar to fire trucks. Location New York City. Z-530.

SALES ENGINEER AND INSIDE MAN to handle secretarial work for concern manufacturing outdoor substation equipment for electric power companies. Two openings. Salary about $200 per month. Location Pennsylvania. Z-537 A & B.

INDUSTRIAL PHYSICISTS. An established research laboratory of well-known manufacturer offers positions to qualified scientific men who have research ability. One or two men of scientific training in physics and experience in research are desired. There is also position open for physicist with less experience but with creative ability. Working conditions are attractive and positions are permanent. Location Ohio. Z-558.

CONSULTING ENGINEER experienced in production of chilled car wheels. Foundry experience on chilled wheels essential. Z-984.

DESIGNER for large textile products manufacturer; special machinery and apparatus and small structures together with the study of factory operation from an engineering point of view. Location New York. Z-1871.

TWO FIRST CLASS LOCOMOTIVE DESIGNERS; will arrange personal interview if within reasonable traveling distance. Location Pa. Z-1895.

ASSISTANT CHIEF ENGINEER, technical graduate, to supervise engineering and drafting-room details in tractor design. Must have thorough engineering and shop experience, and be capable of handling men. Location California. Z-1899.

POWER ENGINEER to take charge of industrial power plant. Good knowledge of boiler-room economics necessary. Technical knowledge required, but need not be graduate. Must also supervise maintenance and operate refrigerating plant. Location Portsmouth, Va. Z-1908.

MECHANICAL ENGINEER with cement mill experience on design and construction. Must be a hustler. Good opportunity. Location Middle West. Z-1910.

INSTRUCTOR to teach mechanics and motor-engine repairs. Technical graduate preferred. Must speak Spanish. Location Lima, Peru. Z-1912.

INSTRUCTOR in mathematics. Location State of Washington. Z-1915.

HEATING AND VENTILATING ENGINEER. Must speak and write Spanish. Location South America. Z-1924.

CONSULTING ENGINEER for company of industrial engineers. Theory of engineering is more important than practical experience. Location Buffalo, N. Y. Z-1926.

SALES ENGINEER to sell power-house equipment in Detroit. Attractive proposition to experienced man. Give full history and earning capacity in reply. Location Michigan. Z-1931.

ASSISTANT TO CHIEF ENGINEER. Man with good engineering education and not less than ten years' experience in design and operation of large steam-power plants, preferably one who has had training in large metal-working establishments and is familiar with furnaces, gas producers and metal-working machinery and practice. Location Pittsburgh, Pa. Z-1934.

OPERATING SUPERINTENDENT, experienced in handling P. & W. boilers, Curtis horizontal turbines, motor-generator-sets, 120-ton electric locomotives operating on 2400 volts d.c. Only experienced men need apply. best of references required; state full particulars in first letter as to age, experience and when available. Location Chile, South America. Z-1940.

SALESMAN for lubricating oils in foreign fields. Men who are thoroughly familiar with marketing abroad in general, even though they have no lubricating-engineering training. Z-1949.

ASSISTANT FACTORY SUPERINTENDENT for company operating several factories in East. Must be technical graduate or have at least three years' practical experience. Work consists partially of factory superintendence and sales. Some knowledge of mechanical drawing necessary. Excellent chance for advancement. Business is that of sheet-metal building materials. Location Jersey City, N. Y. Z-1956

MECHANICAL ENGINEER. Young man to maintain and construct steam power-plant equipment in chain of food-production plants in Illinois, Wisconsin and Canada. Later on will also assist in equipping new factories. Shop experience essential, technical training preferred. Good opportunity with promotion assured. Prefer man who is just emerging from shop apprenticeship, subsequent to his technical training. Older men, however, of exceptional experience will be considered, at possibly higher salary, provided they have first-class executive ability. Location Illinois, Wisconsin, and Canada. Z-1965.

BOILER SALESMAN, preferably one handling horizontal return tubular boilers at present. To work either on salary and commission, or straight commission basis, in New York market. Good opportunity for thoroughly experienced boiler salesman, one who can get results with line manufactured to Massachusetts Standard. Location New York. Z-1975.

TIME-STUDY MAN experienced for machine-shop work. Must understand men. Good opportunity for right man. Location New York. Z-1980.

MECHANICAL ENGINEER with one or two years' experience. M. I. T. graduate preferred. Not over 27, clean, straight American, of superior moral character, and one whose record at the Institute and since is first-class. Regular college course prior to his engineering training would be advantageous. Prefer man who has been in military or naval service and secured commission as Captain in the army or Lieutenant in the navy. Must be willing to go abroad if so desired. Location Massachusetts and abroad. Z-1981.

TECHNICAL AND DRAFTING ASSISTANT, Service Dept., large motor-car company. Work approaches special industrial engineering as applied to service work, covering service station and truck-garage layouts, making of special tool and other drawings, technical data and service repair, instruction and editorial work, and such other special problems as may arise. Especially suitable for a recent technical graduate good at drafting and interested in organization, production and administrative problems of automobile service repair business. Location N. Y. State. Z-1983

BUSINESS MANAGER. Young man of strong character and ability. Experienced in abrasive manufacture and sales. Great opening for permanent connection, but for high-class man only. Location Pennsylvania. Z-1986.

POWER-PLANT OPERATING ENGINEER on turbines, triple-expansion condensing engine, air compressors, generators and motors. Mechanically-fired boilers, some grate stokers. Output of plant 2000 k.w. Permanent. Position with good surroundings for qualified man. Location Missouri. Z-1990.

ENGINEER with some petroleum experience for testing and special field work. Must be technical graduate. Opening may lead to executive position. Location Mexico. Z-2002.

INSPECTOR to report progress on manufacture of oil-refinery equipment, including special boiler-shop fabrication, castings, etc. Technical education and considerable experience with material. Also good knowledge of shop practice. Will represent company and deal with manufacturers in engineering problems. Headquarters New York City. Z-2003.

INSPECTORS, several, technically trained for railroad-equipment tests. Prefer men with some experience in industrial or shop work, but not essential. Work in department consists of testing in laboratory and on road various devices, and changes in locomotive and car construction which are under consideration for standard. As a rule the trial includes development of device under test and, therefore, offers good opportunity for display of ability. Location Pennsylvania. Z-2004.

COMBUSTION ENGINEER, mechanical engineering graduate thoroughly familiar with mechanical stokers. Should have pleasing personality and be capable of conducting boiler tests and assuming responsibility. Work in connection with combustion problems. Location Detroit, Mich. Z-2009.

ENGINEER experienced in sugar industry, preferably cane, competent to make calculations and pass on engineering questions in connection with design of cane-sugar factories. Not a drafting job. What we need is man with good engineering knowledge who is capable of making calculations for a cane-sugar factory. Location New York. Z-2010.

POWER-PLANT SUPERINTENDENT to take charge of large factory power plant. Technically trained. Location Mass. Z-2021.

ENGINEER for research work on problems of employment relation. Practical experience in industry and training in economics required. Location New York City. Z-2029.

YOUNG MAN, preferably technical graduate with 2 or 3 years' shop experience; to take up time study and job analysis. Work would cover wide variety of operations, in a plant of 6000 men. Give complete details in first letter. Location Massachusetts. Z-2030.

FURNACE ENGINEER having experience in design, construction and operation of large industrial furnaces. Excellent opportunity for high class man. Location Ohio. Z-2036.

MASTER MECHANIC, experienced in manufacture of gold-filled watch cases. Location Ohio. Z-2039.

GENERAL INSPECTOR on manufacture of gold-filled watch cases, to look after general quality of work. Location Ohio. Z-2040.

DESIGNER for steam and electric-power plants, not drafting position. Must be able to make calculations on power-station design and eco-

nomics. Graduate from high-grade technical school. Permanent position. Two men needed. Application by letter only. Location New York City. Z-2044.

SALES ENGINEER with two or three years' experience, preferably in oxyacetylene apparatus. Location New York City. Z-2045.

AIR-COMPRESSOR DESIGNER thoroughly experienced, who can figure cost and production. Give experience, reference and salary expected to start. Location New York City. Z-2048.

GENERAL FOREMAN for boiler shop. Must be man of broad boiler-manufacturing experience. Good executive ability, able to direct efforts of 200 men. Must know boiler details to the last degree. Salary to suit proper man. Location Erie, Pa. Z-2049.

TWO SALESMEN for pneumatic tools. Not absolutely necessary to have actual experience in the line, but must have general knowledge of such business and some sales experience. Location, one man to work out of town and one for New York office. Z-2053.

INDUSTRIAL PHYSICIAN, preferably young man with some experience and a leaning toward that work, with enough initiative to organize and supervise department with two or three assistants. Location New York. Z-2057.

ASSISTANT PLANT MANAGER. Must be graduate mechanical engineer with thorough knowledge of electricity and three to five years' experience. Must also be good executive and able to handle men. Position is with large bottle company in Ohio. Good opportunity for advancement. Man between 30 and 40 preferred. Location Ohio. Z-2058.

SALES ENGINEER to sell derricks for hoisting engineer. Should have construction and sales experience. Location Eastern U. S. Z-2062.

INSTRUCTOR in mechanical engineering required to teach mechanical laboratory and internal-combustion engineering. Engineering graduate with some practical experience desired; teaching experience desirable but not essential. Location Philadelphia. Z-2065.

MECHANICAL ENGINEERING GRADUATE to teach design, gas engine and mechanical laboratory to seniors and supervise laboratory. Location Houston, Texas. Z-2066.

MASTER MECHANIC AND MAINTENANCE ENGINEER for chemical engineering plant. Permanent position. Acetic acid plant. Location New Jersey. Z-2069.

INSTRUCTOR in wood shop, pattern making, carpentry. Teaching experience essential. Intermediate technical training. Three year contract. Location Constantinople, Turkey. Z-2080.

INSTRUCTOR in foundry and forge shop. Teaching experience essential. Intermediate technical training. Three year contract. Location Constantinople, Turkey. Z-2081.

ENGINEER with three or four years' experience in efficient operation of boiler plants. Give complete education and experience, together with age, reference, salary expected, etc. Location Middle West. Z-2092.

DESIGNERS for large machine-tool shop, experienced in design of medium and heavy machine tools used in locomotive and car shops and large machine shops. Give full particulars as to age, training, and experience. Location Mass. Z-2093.

GENERAL SALES MANAGER to take full charge of sales promotion, domestic and export, for a company manufacturing complete line of air compressors, vacuum pumps and centrifugal pumps; require man with initiative and full knowledge of this line of machinery, as well as broad experience in handling selling organization. Unlimited opportunity for right man. Location Penn. Z-2094.

MECHANICAL ENGINEER with wide experience in industrial-plant layout and factory production work, preferably with experience on steam-heating boilers, radiators, etc. Should have good knowledge of conveying equipment. Must also have experience along production lines and be able to supervise setting of piece rates, bonus systems, incentives. Location N. Y. City. Z-2095.

DESIGNER to take charge of designing Diesel engines for installation in cargo vessels; require man experienced in design and development of Diesel engines for marine work and at same time thoroughly competent and practical marine engineer. Location New Jersey. Z-2102.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 10th of the month preceding date of issue and should be limited to 45 words. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

ASSISTANT PRODUCTION ENGINEER, or shop superintendent, 32, married. Exceptional shop, technical and education experience on large and small work. SM-5552.

SALES ENGINEER, technical graduate, 27, single, 8 years' specialized experience in design of locomotives and railway-rolling stock, desires connection with growing railway equipment or steel company in traveling sales capacity. Good personality, references. Keenly interested in railway field. Will travel anywhere. SM-5553.

MECHANICAL ENGINEER, 36, married, 16 years' experience, draftsman, designer, assistant works engineer, on freight and passenger elevator, also elevating and conveying machinery. At present holds responsible position on plant layout work. Desire to connect permanently in manufacture or construction. Location N. Y. City or N. J. SM-5554.

ENGINEER, as assistant to general manager or president of manufacturing company. Duties to be partly executive and partly devising and putting into effect improvements in design and manufacturing details. Cornell graduate M.E., several years experience, age 30, preferred location Cleveland. Salary $5000. SM-5555.

ACCOUNT-ENGINEER, experienced in C.P.A. office; M.E. graduate; desires position in accounting or executive work where technical training can be utilized. No actual experience in cost work, though familiar with theory. Married, 30, Protestant, possessing initiative, good personality; highest engineering and accounting references. SM-5556.

SUPERINTENDENT, or industrial engineer, graduate mechanical engineer; 15 years' practical experience along mechanical lines, machine-shop practice, pattern making, design, foundry practice and efficient production and cost methods. Thoroughly familiar with Taylor system of organization and bonus or piece-rate systems. With present employers ten years. Would invest. Location Chicago. SM-5557.

MECHANICAL ENGINEER, 38, married, M.E. graduate, 18 years' experience in steam engineering, reciprocating machinery and uniflow engines, as draftsman, chief, designer, testing, superintending, consulting engineer and inventor. Desires suitable position in research, experimental or development, preferably steam engineering. Good references. Resourceful, energetic and capable to take charge. Philadelphia or East preferred. SM-5558.

MECHANICAL AND STEAM-POWER ENGINEER, 31, married. Technical graduate. Good executive. Ten years' practical experience in shop practice, power plant, operation and construction and steam heating, holding positions of assistant chief engineer and construction superintendent with large corporation. Experienced in handling either white or colored labor, and well versed in safety and welfare work. Minimum salary $4000. SM-5559.

MECHANICAL ENGINEER, 27, four years' experience in drafting, designing, machine-shop and construction work; 15 months in army, desires position of responsibility. Philadelphia or vicinity preferred, but not essential. SM-5560.

MECHANICAL ENGINEER, 25 years' experience. Expert on design of manufacturing equipment. Good executive and organizer with ability to get results. SM-5561.

GENERAL MANAGER, proven executive and organizer with long experience in handling of men and thoroughly familiar with all branches of manufacturing and general business training in connection with same. Capable of organizing all departments from the taking in of crude materials to marketing of finished product. Twenty years' experience in above lines in manufacture of motor trucks, heavy-duty engines and passenger cars. At present employed by leading manufacturer in Middle West. SM-5562.

MECHANICAL ENGINEER, technically trained, 38, experienced in design and mechanical development work including cord-tire specifications, desires connection with rubber company on Pacific Coast. SM-5563.

MECHANICAL ENGINEER, now in charge of drafting room desires position as chief draftsman, assistant engineer or designer. Ten years' experience including drafting on gas engines. Automotive work and mill machinery; inspection and teaching of experimental and mechanical engineering. SM-5564.

SALES ENGINEER, resident Canada, having valuable connection. Practical and theoretical training, desires to connect with firm wishing representative in Canada. SM-5565.

SALES ENGINEER, 35; 10 years' experience in engineering. Also manager Philadelphia territory for Western concern for three years. Desires new connection with good live firm to cover mill and factory trade. SM-5566.

MECHANICAL ENGINEER, technical graduate, employed for past year and a half as equipment and tool engineer, having charge of all planning and purchasing on new $1,500,000 machinery installation in Middle West. Desires new connection, this work having been completed. Available about September 15 to October 1. Salary about $3600 a year. SM-5567.

EXECUTIVE ENGINEER, twenty years' broad practical experience in design, construction and operation of mechanical industries; successfully handled engineering work of large, well-known companies; would be pleased to receive communications from firms that want engineer of merit. SM-5568.

INDUSTRIAL OR PLANT ENGINEER; mechanical engineering graduate, 1914, age 31, single; six years' varied manufacturing. Experienced as draftsman, installing production system, foreman, plant engineer, time study and rate setting, industrial-engineering plant lay-out. Good personality; available immediately. Salary $3600. SM-5569.

TECHNICAL GRADUATE, 28, practical shop, erecting and sales experience in different parts of country, desires to connect with growing concern in capacity which will lead to executive position. At present employed in charge of a department. SM-5570.

ENGINEER DRAFTSMAN, American, 32, married; twelve years' marine steam engineering, steam turbines, steam-power plants, piping, machine designing. At present chief draftsman, supervising design and installation of engines, boilers, auxiliaries and piping. Available October 1, 1920. SM-5571.

AUTOMOTIVE ENGINEER, high-grade, experienced internal-combustion engine design, graduate M.E. Desires position as chief engineer, assistant chief engineer, research engineer or designing engineer, with automotive company or engine manufacturer. First class references. SM-5572.

MECHANICAL ENGINEER, 35, married; 12 years responsible experience in design, construction and operation of power plants, ice plants and heating systems, also power reports., estimate and valuations. SM-5573.

MANUFACTURING COST-REDUCTION ENGINEER who in past year has created unusual record for saving in cost of production for large automobile parts manufacturer, desires new connection in same or similar line. SM-5574.

MECHANICAL ENGINEER, technical graduate, 35, married; experience in railway-mechanical work, and long experience in heavy-machine and foundry work, desires connection with progressive concern as works manager. SM-5575.

MECHANICAL ENGINEER, 31, technical graduate, 9 years' experience in manufacture, maintenance, and design of steam locomotives, as machinist, inspector, foreman, air-brake supervisor, draftsman, designer and mechanical engineer. Thorough knowledge of locomotives and air-brake equipments. Now employed, but desires more responsible position offering opportunities for advancement, preferably with engineering department of railroad, locomotive builder or railroad supply firm. SM-5576.

TECHNICAL GRADUATE, mechanical, age 27, desires position where push and conscientious work is required. Have had experience in drafting and business in semi-executive capacity. Future greater object than the present salary. SM-5577.

MECHANICAL ENGINEER, executive, designer, expert in design of intricate, labor-saving devices, adding and calculating machinery, etc.,

production methods, etc. Available immediately. SM-5578.

REFRIGERATING ENGINEER, experienced in ice plants and at present owner of northern plant, desires position in capacity of operating and consulting engineer in Southern plant for six winter months. Thoroughly practical man. Also technical training and post-graduate course in refrigeration at leading university. Expect work of winter months to be of more than temporary value. SM-5579.

MECHANICAL ENGINEER AND EXECUTIVE, 33, 15 years' experience covering broad field in operating, repair, design and construction of mechanical lines. Capable organizer or representative; has traveled abroad. Speaks three foreign languages. Willing to go abroad or to the Orient. Minimum salary $6000 per year. SM-5580.

MECHANICAL ENGINEER, of exceptional executive ability; 22 years, covering design and development of methods, tools, machinery and equipment for economical production. Successful organizer experienced in factory management, maintenance and general construction. At present chief engineer and works manager. Open for engagement in similar capacity or as plant engineer. SM-5581.

WORKS MANAGER OR SUPERINTENDENT, 16 years' training and experience, from machinist to manager. Specialist in modern machine shop, practice, tool and machine design. Successful in organizing, developing and building up existing organization for results. Since release from Engineers, U. S. A., engaged in reorganization of plant. Graduate M. I. T. Age, 37, unmarried. Available promptly, work here being nearly completed. Desires to locate in New England or East. SM-5582.

MECHANICAL ENGINEER, technical graduate, 4 years' shop experience, 13 years' experience in design, detailing, construction ad appraisal of industrial and chemical plants, desires position with manufacturing firm as plant engineer or with engineering firm. SM-5583.

PURCHASING ENGINEER, or assistant to executive. Experienced in buying large quantities of material and in manufacturing tractors, automobiles and electrical equipment. Familiar with purchasing problems, follow-up schedules, and stores control. Purchasing work in Middle West preferred. SM-5584.

MECHANICAL ENGINEER, 31; technical graduate, nine years' experience in locomotive manufacture, maintenance and design, as inspector, foreman, airbrake supervisor, draftsman, designer and mechanical engineer. Desires good live position affording opportunity for advancement with engineering department of railroad, locomotive builder, or railway supply firm. SM-5585.

PETROLEUM ENGINEER or refinery superintendent, with 8 years' practical experience; married, 32 years old; graduate mechanical engineer; salary $5000; location immaterial. Desires position where efficiency counts. Have had practical experience in manufacturing of all petroleum products. SM-5586.

PROFESSOR OF MACHINE DESIGN, and allied subjects available for appointment this fall. Has had successful teaching career in large Eastern University. During past few years and at present in responsible engineering position, but desires to re-enter teaching profession. Best references. SM-5587.

SALES ENGINEER, 30, married; technical graduate, 9 years' practical experience, desirous of changing to selling side of engineering: iron and steel company or house handling engineering specialties preferred. Initial salary immaterial if prospects of future advancement are good. Philadelphia or vicinity preferred. SM-5588.

MECHANICAL ENGINEER, technical graduate, 28 years of age; both drafting and field experience in steam plants and chemical plants, also estimating and purchasing experience, desires connection with industrial concern. Salary $3600. SM-5589.

MECHANICAL ENGINEER, executive, college graduate, age 34, married. Broad experience in design, construction and operation of engineering project. At present superintendent of large public utility corporation. Possesses pleasing personality; tactful, and keen executive. Desires to associate with progressive business where ability and hard work will be recognized. SM-5590.

DESIGNER ENGINEER, 34; 13 years' experience. Specialized in medium-weight, special and automatic machinery; knowledge of standardization work for interchangeable manufacture, planning and design of tools and gages; also familiar with sheet-metal stamping work. Capable of managing department. Location New York City or vicinity. SM-5591.

MECHANICAL ENGINEER, Yale graduate, 28; six years' of varied experience in manufacturing. Thoroughly familiar with modern mechanical engineering and production methods. Desires position with progressive manufacturing concern. SM-5592.

EXPORT-ENGINEER, technical training, 17 years' engineering and commercial experience including export sales promotion, having many large foreign connections, wishes to represent in New York, manufacturing of machinery, tools, hardware or engineering lines, for promoting export trade, or domestic business. SM-5593.

MANAGER, SUPERVISING ENGINEER, or superintendent, with 20 years' varied experience, exceptional executive and mechanical ability, judgment and tact, technically trained engineer in addition to being practical mechanic. Can develop progressive methods and processes for quality, quantity and low cost in shops and factories in growing concern or work out new enterprises. SM-5594.

EXECUTIVE, professional engineer and consultant in factory organization and management, desires to give up professional work and become identified with progressive manufacturing organization. Age 31. SM-5595.

ASSISTANT TO PRODUCTION ENGINEER, or manager. Technical graduate. A year in intensive research work in textile industry including time study, two years in Engineers as commissioned officer, one year in personnel work of nationally-known company, well versed in modern practices of industrial management. Age 28; minimum salary $2800. SM-5596.

ENGINEER EXECUTIVE, with experience and education, including modern business, wishes good permanent connection. A-1 man in shop, in drafting department and as production and process engineer on small and medium interchangeable products made by cutting or stamping brass, steel, etc. SM-5597.

ESTIMATING ENGINEER, young married man; two years' technical training, drafting and shop-layout experience; nearly three years as cost estimator of pressed-steel auto frames and stampings, seeks position as estimator and sales engineer, or technical sales correspondent. Prefer Eastern or Southern States. SM-5598.

MECHANICAL ENGINEER, experienced in teaching M.E. subjects, designing and constructing sugar machinery, textile machinery, plant maintenance, production of small arms and research laboratory, and tractor design, wishes executive engineering position or Professor's chair in mechanical engineering. SM-5599.

YOUNG EXECUTIVE, at present employed as superintendent of machine shop. Five years' experience in shops and as head of production department of large corporation. Salary $5000. SM-5600.

MECHANICAL ENGINEER, technically educated and trained, over 20 years' experience in consulting, constructing and executive capacities in various branches of engineering work. Recently released, three years in U. S. Air Service with rank of Major; experienced in internal-combustion engines and airplane construction. Desires responsible position with reliable concern, preferably on Pacific Coast, but location immaterial if position satisfactory. SM-5601.

PLANT ENGINEER AND MANUFACTURING EXECUTIVE, highly educated, with good personality and backed by 15 years' successful experience in general engineering and contracting business. At present in entire charge of all construction and maintenance of plants for large manufacturing concern. Accustomed to large responsibilities and thoroughly experienced in economic handling of maintenance problems. In short time open for similar engagement. SM-5602.

MECHANICAL ENGINEER, technical graduate M.E. and E.E., 15 years' experience as maintenance engineer, plant engineer and designer with well known concerns. Expert systematizer and organizer. Now employed. Desires position as maintenance engineer, plant engineer, systematizer, or designing instructor. Location preferred, Michigan or South. SM-5603.

FACTORY SUPERINTENDENT, American, 37; 12 years' experience in manufacture of brass and steel stampings. Thorough knowledge of industrial engineering and its practical application. Close observer of costs. Successfully employed as foreman of slitting machinery; foreman of power-press department; manufacturing superintendent, and production engineer. Salary $7000. SM-5604.

MECHANICAL ENGINEER, technical graduate, 27. Five years' experience as designer, experimental engineer and executive's assistant, chiefly on light, accurate interchangeable products. Desires position of responsibility with ample opportunity for promotion. SM-5605.

MECHANICAL AND ELECTRICAL ENGINEER, with 15 years' experience in design, erection and operation of mining power plants and mining machinery, both steam and electrically driven. Experienced executive. Can work in harmony with operating department. Familiar with large corporation methods. SM-5606.

CONSULTANT AND CONSTRUCTION MECHANICAL ENGINEER, seeks connection with live wire, established consulting engineering firm. College graduate. Twelve years' experience in general mechanics and special training in all engineering phases pertaining to power-plant design, construction and operation. Well acquainted with European engineering practice and willing to go abroad. Speak three main languages. Salary commensurate to responsibility. SM-5607.

CHIEF OR PLANT ENGINEER. Young American. Served as chief engineer, plant engineer, systematizer and consulting engineer on foundries for large corporations. Thoroughly practical man having started at bottom. Forceful executive and organizer, successfully handling both men and women. Open for engagement about November. Best references. Salary minimum $6500. SM-5608.

MECHANICAL AND CHEMICAL ENGINEER, graduate of Stevens Institute, with ten years' engineering experience, accustomed to directing and taking full charge of the design, construction and maintenance of complete chemical plants, including power-house, buildings, and all equipment, desires responsible position where his thorough engineering and business training can be used to advantage. Age 31, married. Salary $6000. SM-5609.

WORKS MANAGER or general superintendent; 21 years' practical experience as a mechanical and executive in manufacture of steam, Diesel and gas engines, interchangeable parts, special machinery, jigs, fixtures, tools, cutters and gages. Excellent record as manager and producer. Age 38, married; want Eastern location. SM-5610.

SALES ENGINEER, 30, M.E. graduate University of Wisconsin; several years of machine shop experience; for past three years successfully selling heavy machinery in New York market; wishes to associate himself with a progressive sales agency in Middle West. SM-5611.

MECHANICAL ENGINEER, 30, Cornell graduate; sales, engineering, production, and executive experience along automotive manufacturing lines, desires connection with live manufacturing or sales organization in vicinity of Chicago. SM-5612.

MECHANICAL ENGINEER, technical graduate, 20 years' broad experience as chief draftsman, estimating engineer, chief engineer, master mechanic and superintendent of plant, in design construction and operation of light, heavy and automatic machinery and of industrial and power plants complete, desires executive position. SM-5613.

MECHANICAL AND ELECTRICAL ENGINEER, two years' civil engineering, four years' mechanical and electrical university course: 14 years' experience comprising design and construction of oil refinery, locks and dams, rifle and machine-gun plant, shipyard, boiler and powder plants, armor-plate and gun-forging plant; including installation of hydraulic, steam, air, and electrical equipment incident thereto. Thoroughly practical with executive ability; not afraid of work. No objection to foreign service provided salary is commensurate with position and location. Minimum U. S. $5000. At present employed. SM-5614.

MECHANICAL ENGINEER, technical graduate, married; four years' experience testing, operation and maintenance of industrial and public utility steam-turbine power plants of 15,000 to 30,000 k.w. capacity, both coal and oil burning. Prefer Pacific Coast. SM-5615.

MECHANICAL ENGINEER, 36; experienced plant executive; 10 years' active experience field and office, design, erection, operation and maintenance of power and industrial plants, specialist on steam-power and pumping plants, turbo-generators, hydraulic mining and dredging. Discharged after two years war service Captain Engineers and desire connection Pacific Coast or Inter-mountain states. Available October 1. SM-5616.

MECHANICAL ENGINEER or superintendent, desires position with manufacturing plant. Technical education, 32 years old, married. Has 12 years' experience from draftsman to manager. Very broad experience in steam-power plant and industrial engineering. Officer in Navy during late war. Location anywhere east of Mississippi, South Atlantic States preferred. Connection desired with concern that wants man with ability to produce results. Salary $6000. SM-5617.

MECHANICAL ENGINEER, technical graduate, 36, single; 12 years' experience machinist, master mechanic, material inspector, chief engineer, and electrician, general contractor, installed and operated steam and hydro-electric power plants; over 3 years with I.C.C. on R.R. valuation, one year office; 2 years in charge of Field work. Prefer Pacific Coast. Minimum salary $350. SM-5618.

MECHANICAL ENGINEER OR EXECUTIVE, technical graduate; 19 years' practical broad engineering and business experience. Plant layout, construction, specifications and purchase of equipment, tests, maintenance and operation. Fuel efficiencies and economies. Design, construction and installation of labor-saving and material-handling machinery. Competent on manufacturing and shop organization and system. Capable of responsible charges, sales included. Strong credentials. Present salary, $5000. SM-5619.

ASSISTANT TO EXECUTIVE, chief engineer or sales; Harvard graduate. 10 years' experience hoisting, conveying, power-transmission and coal-handling apparatus. Thoroughly familiar with above lines as designing engineer and practical application. Able correspondent and office manager. Desires responsible connection with reliable and progressive firm. SM-5620.

WORKS ENGINEER with 10 years' experience planning, building and equipping new plants and increasing production in existing plants, also supervision of maintenance of plant and equipment. Excellent executive accustomed to handling successfully large number of men. SM-5621.

MECHANICAL ENGINEER, Columbia graduate, age 28. Five years' experience on construction work, and in all departments of large electric-light and power company. Desires position on industrial work. SM-5622.

EXECUTIVE with five years' experience desires position with progressive concern. Formerly assistant chief engineer with largest ignition manufacturer. Now assistant works manager with concern in similar business. Cornell graduate, M.E. degree. Energetic and capable. Will furnish best of references. Married, age 28. Interview desired. SM-5623.

New Members of the Society

The Publication Committee has decided to give the membership the additional service of printing monthly additions to the list of members. Heretofore such information has appeared but once a year in the Year Book. The list which follows starts with the first members to qualify since the 1920 Year Book went to press and is complete to August 1. The grade is indicated by the symbol after the name: i.e. M = Member; A = Associate; AM = Associate-Member; J = Junior.

ABE, Keiichi—M, Toyko, Japan
ABRAMS, Joseph H.—J, Philadelphia, Pa.
ADAMS, Thomas D.—J, Afton, N. Y.
ADDINGTON, Herbert B.—J, Cleveland, Ohio.
AHLERS, J. A.—J, Cincinnati, Ohio.
AIKEN, J.—AM, New Orleans, La.
AITCHISON, Clyde S.—J, Berkeley, Cal.
ALBERS, Edwin W.—J, Schenectady, N. Y.
ALDRICH, James F.—J, Cleveland, O.
ALLEY, Vernon F.—J, Philadelphia, Pa.
ALVEN, Alfons—J, New York, N. Y.
AMADON, Charles S.—J, New London, Conn.
ANSCOTT, William—J, Brooklyn, N. Y.
ANDERSON, Ernest E.—J, Detroit, Mich.
ANDERSON, J. Elmer—J, Springfield, Mass.
ANDREWS, Roger W.—A, Pittsburgh, Pa.
APPLETON, Clifford T.—J, Bridgeport, Conn.
ARKWRIGHT, Reuben—AM, New Glasgow, N. S. Canada.
ARMSTRONG, Lester E.—J, St. Louis, Mo.
ARTHUR, Harold M.—A, Shreveport, La.
ASHLEY, George R.—J, Elizabeth, N. J.
ASPEY, Joseph H.—J, Boston, Mass.
ATKINSON, Henry G.—J, New York, N. Y.
AVERY, Leon J.—J, Lowell, Mass.
AVERY, Nathan C.—AM, New Britain, Conn.
AYAU, Manuel S.—J, New York, N. Y.
AYRES, Elwood B.—M, Philadelphia, Pa.
AYRES, Russell Wm.—J, Stamford, Conn.
BAASE, Fred J.—A, Roxbury, Mass.
BABUSH, Jos. S.—J, Milwaukee, Wis.
BACON, Chester A.—M, Auburn, N. Y.
BAILEY, George N.—M, Worcester, Mass.
BAK, Anders K.—J, New Haven, Conn.
BALCH, Samuel W.—M, New York, N. Y.
BALL, Lester W.—J, Portsmouth, N. H.
BANKS, Walter S.—AM, Bridgeport, Conn.
BARBER, Louis—M, Cleveland, O.
BARNARD, Morris C.—J, Brooklyn, N. Y.
BARNHART, Clarence D.—J, New York, N. Y.
BARRETT, Chas. D.—M, Altoona, Pa.
BARSKY, George—J, New York, N. Y.
BASSLER, Edwin M.—M, Milwaukee, Wis.
BATCHELDER, Nelson A.—M, Providence, R. I.
BATESOLE, Dwight E.—AM, Toledo, O.
BEATTIE, Jos. A.—J, Los Angeles, Cal.
BECKER, Harry N.—AM, Wilmington, Del.
BECKLEY, Leroy W.—AM, Fairfield, Ala.
BELL, Alexander H.—AM, El Dorado, Kan.
BELLIS, Alfred P. S.—M, Trenton, N. J.
BENJAMINS, Israel—J, Brooklyn, N. Y.
BENNETT, William H. K.—M, Chicago, Ill.
BENSON, Harry F.—M, Holyoke, Mass.
BERARD, Samuel J.—M, New Haven, Conn.
BERDGE, Edw. A.—AM, Brooklyn, N. Y.
BERGER, Alfred R.—AM, Brooklyn, N. Y.
BERKELEY, Lawrence, J.—AM, Milwaukee, Wis.
BERRY, B. C.—J, Marion, O.
BETZ, Albert C.—J, Bradford, Pa.
BICK, Harold N.—J, New York, N. Y.
BIXBY, Ezra M.—M, New Haven, Conn.
BLACKBURN, Felix—AM, Holyoke, Mass.
BLAKE, Harold N.—M, Anaconda, Mont.
BLAISDELL, Sidney B.—J, Annapolis, Md.
BLATCHFORD, John—AM, Chicago, Ill.
BOATE, Gerald A.—AM, Ottawa, Ont., Canada.
BOILEAU, Arthur H.—J, Wellsville, N. Y.
BOND, Allison H.—AM, Columbus, O.
BONNELL, Clement M., Jr.—J, New York, N. Y.
BORNSTEIN, Jos.—AM, Boston, Mass.
BOURKE, Norman T.—J, Omaha, Neb.
BOWDEN, John H.—AM, Rio de Janiero, Brazil, S. A.
BOWSER, Stanley W.—J, New York, N. Y.
BOYLE, John R.—J, Chicago, Ill.
BRADFIELD, Edmund S.—J, Barnesville, O.
BRANDIS, Wm. F., Jr.—J, New York, N. Y.
BRATT, Ralph T.—J, New York, N. Y.
BREED, Everett M.—M, San Francisco, Cal.
BRISTOL, Edw. S.—J, Philadelphia, Pa.
BROSTEDT, Carl W.—AM, Springfield, Mass.
BROUGHTON, H. E.—A, Allentown, Pa.
BROUSSEAU, Edw. W.—J, New York, N. Y.
BROWN, Jas. A.—M, New York, N. Y.
BROWN, Warren G.—AM, Cincinnati, O.
BRUBAKER, Walter S.—M, Wilmington, Del.
BRUCK, Albert G.—AM, Cincinnati, O.
BRUEMMER, Chas. H.—M, New Britain, Conn.
BRUMBLE, W. C.—J, Muncie, Ind.
BRUNER, R. W.—J, Annapolis, Md.
BRUSSTER, Jas. S.—M, Detroit, Mich.
BRUSSTER, Jas. S.—J, Cleveland, O.
BRYMAN, Harry—J, New York, N. Y.
BUCK, Henry R.—M, Hartford, Conn.
BUCK, Herman J.—M, Ellwood City, Pa.
BUCHMAN, Louis—J, Windsor, Ont., Canada.
BUESSER, Fred F.—J, Jersey City, N. J.
BULL, William C.—M, New York, N. Y.
BURCH, Thos. H., Jr.—M, New York, N. Y.
BURCHETT, Walter J.—M, Newark, N. J.
BURHEN, Raymond—AM, Washington, D. C.
BURLINGAME, Chas. R.—J, Moore, Pa.
BURLINGHAM, Wm.—M, New York, N. Y.
BURNS, Alan E.—AM, New York, N. Y.
BURNS, Wm. H.—M, Appleton, Wis.
BURTON, Syden W.—AM, Providence, R. I.
BUYERS, Donald E.—M, Rock Falls, Ill.
BYER, Henry E.—M, Philadelphia, Pa.
BYNUM, Edwin A., Jr.—J, Cisco, Tex.
CAHLE, Herbert W.—AM, Detroit, Mich.
CABLITZ, Fred. G.—J, Hoboken, N. J.
CAIN, John N.—AM, Ashtabula, Ohio.
CALDER, Horace W.—A, Baltimore, Md.
CALDWELL, William F.—AM, Philadelphia, Pa.
CALL, A. E.—AM, Cincinnati, O.
CALLARD, Chas. G.—J, Lansing, Mich.
CAMERON, Archibald P.—M, London, Eng.
CAMPBELL, Archibald—J, Moore, Pa.
CANAVAN, William F.—M, Decatur, Ill.
CANNON, Wilford Y.—AM, Salt Lake City, Utah.
CARLTON, Henry T.—M, San Francisco, Cal.
CARROLL, Michael J.—J, Syracuse, N. Y.
CARROLL, Jr., Phil.—J, East Pittsburgh, Pa.
CARRUTH, Edwin W.—AM, Meriden, Conn.
CARY, Joseph B.—AM, New York, N. Y.
CASE, Percival H.—J, Rochester, N. Y.
CASEY, Wm. R.—AM, Springfield, Mass.
CASTER, John E.—J, Cincinnati, Ohio.
CASTON, George W.—AM, Rochester, N. Y.
CERECEDO, Javier H.—J, San Juan, P. R.
CHAMBERLAIN, George E.—AM, Baltimore, Md.
CHAMBERS, George G.—J, New York, N. Y.
CHAPIN, John J.—M, New York, N. Y.
CHAPLIN, John H.—J, Bristol, Conn.
CHAPMAN, Cyril T.—J, Scranton, Pa.
CHASAN, Louis H.—J, New York, N. Y.
CHEN, Yung Han—J, Hoboken, N. J.
CHESNEY, Malcolm M.—J, Pittsfield, Mass.
CLARK, McKinley F.—J, Beatrice, Neb.
CLARK, Thomas S.—N, Brooklyn, N. Y.
CLARK, Walter J.—J, Brooklyn, N. Y.
CLARK, Watson G.—M, New York, N. Y.
CLARKE, Clarence P.—M, Pittsburgh, Pa.
CLARKE, Capt. I. Brooks—M, Meriden, Conn.
CLARKE, Wm. W.—J, Bridgeport, Conn.
CLEARY, James F.—AM, Newburgh, N. Y.
CLEMENS, Alonzo W.—M, Bethlehem, Pa.
CLINCH, Chas. H.—M, Carthage, N Y
COBB, Arthur—M, Lakehurst, N. J.
COCHRAN, Ethelbert J.—M, Hamilton, Ohio.
COCHRANE, Wm. F.—M, So. Baltimore, Md.
COLE, Benjamin E.—AM, Bethlehem, Pa.
COLE, Ralph A.—J, Jackson, Mich.
COLEMAN, Jr., Thomas C.—J, Chicopee Falls, Mass.
COMBE, Frank A.—M, Montreal, Quebec, Canada.
COMFORT, George B.—M, Frankford, Pa.
CONNOR, Alexander P.—AM, Springfield, Mass.
COOHAN, Frank G.—J, Chicago, Ill.
COOK, Harmon T.—J, Torrington, Conn.
COOK, James C.—M, Atlanta, Ga.
COOK, John W—M, New York, N. Y.
COOKE, A. F.—M, Pittsburgh, Pa.
COOPER, James E.—AM, Bridgeport, Conn.
COTHRAN, James S.—M, Charlotte, N. C.
COVERT, Homer L.—J, Louisville, Ky.
COX, Thomas R.—AM, New York, N. Y.
CRANE, Henry M.—M, New York, N. Y.
CRAUN, J. M.—J, St. Louis, Mo.
CROFT, Huber O.—J, Denver, Col.
CROSIER, Paul E.—AM, Indianapolis, Ind.
CROSS, Harold W.—M, Chicago, Ill.
CROUCH, Ray C.—AM, Leetsdale, Pa.
CROWLEY, Charles P.—J, Philadelphia, Pa.
CRUSER, F. Van Dyke—M, New York, N. Y.
CULLEN, Charles R.—J, Lima, Peru.
CUMMINGS, Stanley R.—J, Woolaston, Mass.
CUTTER, Edmund I.—AM, Norwood, Ohio.
DA COSTA, 3rd., John C.—Philadelphia, Pa.
DALTON, Howard H.—M, New York, N. Y.
DANIELS, Dwight C.—AM, Worcester, Mass.
DANIELS, John H.—M, Providence, R. I.
DAVIDSON, John L.—J, Gary, Ind.
DAVIS, E. W.—M, New York N. Y.
DAVIS, Harvey N.—M, Cambridge, Mass.
DAVIS, Oscar A.—M, Alliance, Ohio.
DAY, Ralph R.—M, Port Jefferson, L. I., N. Y.
DEAN, Archer G.—M, Philadelphia, Pa.
DEAN, Stuart—M, Indianapolis, Ind.
DEARBORN, Richard J.—M, New York, N. Y.
DE BARR, Edwin—M, Norman, Okla.
DeBOOS, Frank A.—AM, Chicago, Ill.
DeBUTTS, Dean J.—J, Tulsa, Okla.
DEEDS, Dean Dalton—M, Lorain, O.
DEGENER, Gustave O.—AM, New York, N. Y.
DeLORENZO, Otto—J, New York, N. Y.
DEMAREST, Stirling J.—J, New York, N. Y.
DEMPSTER, Clyde B.—J, Beatrice, Neb.
DENNEN, Walter B.—J, Worcester, Mass.
DE ROSAY, Kingsley E.—J, No. Phila., Pa.
DeVIGNIER, Robert M.—M, New Jersey.

DEVINE, James J.—J, Troy, N. Y.
DE VRIES, Daniel—J, Passaic, N. J.
DEWEY, Harry E.—AM, Toronto, Ont., Canada.
DEWEY, Maurice J.—J, Houston, Texas.
DEXTER, A. Morton—M, Philadelphia, Pa.
DICKIE, Alexander J.—A, San Francisco, Cal.
DILLON, Edward H.—A, Philadelphia, Pa.
DINGMAN, Charles F.—M, Palmer, Mass.
DIXON, William E.—M, Cambridge, Mass.
DODGE, Arthur C.—A, Cincinnati, Ohio.
DODSON, Rowland W.—J, E. St. Louis, Ill.
DOEN, Loran F.—AM, Flint, Mich.
DONOVAN, William T.—J, New York, N. Y.
DOWELL, Dawson—J, Philadelphia, Pa.
DOWNS, Sydney F.—J, Landsford, Pa.
DRAKE, John L.—J, Defiance, O.
DROMGOOL, Peter J.—AM, New Orleans, La.
DRYSDALE, Walter D.—M, Detroit, Mich.
DUFF, Philip J.—M, Philadelphia, Pa.
DULLIGAN, Charles E.—AM, Lowell, Mass.
DUNCAN, James R.—AM, New York, N. Y.
DUNCAN, Leonard R.—J, Brooklyn, N. Y.
DUNN, Albert L.—J, East Norwalk, Conn.
DUGAN, Samuel A.—AM, New York N. Y.
EBY, Samuel E.—AM, Ridley Park, Pa.
EICHHORN, Harry L.—AM, Oak Park, Ill.
EISERT, Hermann—M, Baltimore, Md.
ELERS, Karl F.—M, Verona, Pa.
ELEY, J. N.—J, Atlanta, Ga.
ELLIS, George J.—J, Philadelphia, Pa.
ELLIS, Gershom P.—J, Boston, Mass.
ELLIS, J. Corson—AM, Canastota, N. Y.
ELLIS, Leon D.—J, Boston, Mass.
ELLIS, Roy M.—A, Philadelphia, Pa.
ELLISON, Michael H.—AM, Hamilton, O.
ELSNER, William H.—AM, St. Paul, Minn.
EMERSON, Milton—AM, Cincinnati, O.
EMMONS, Louis J.—J, Portland, Md.
ENGLEKING, Walter W.—J, Duluth, Minn.
ENSIGN, William B.—M, New York, N. Y.
ESTES, Frederick A.—M, Boston, Mass.
EUSTIS, Irving N.—J, Fairmont, Minn.
EVANS, Gilbert H.—J, Brooklyn, N. Y.
EVANS, Gordon M.—J, Keeseville, N. Y.
EVERHART, Harold S.—AM, Columbus, Ohio.
EWING, George H.—M, Seattle, Wash.
FAIRMAN, Seibert—J, Lynn, Mass.
FAY, Fred B.—AM, Worcester, Mass.
FEENEY, Frank A.—J, New York, N. Y.
FERGUSON, D. M.—AM, New York, N. Y.
FIEGE, Henry J.—J, Waterbury, Conn.
FIELD, Malcolm F.—J, Springfield, Mass.
FINE, Lewis—AM, Philadelphia, Pa.
FINEGAN, Leo—M, Baltimore, Md.
FISCHER, Boyd—A, Philadelphia, Pa.
FISKE, Warren M.—J, Milwaukee, Wis.
FLANDERS, Chas. E.—J, Waverly 79, Mass.
FLEISHER, Simon—M, Lynn, Mass.
FLEMING, Lawrence T.—AM, Chicago, Ill.
FLORCYKE, Edw. M.—J, Bethlehem, Pa.
FLYNN, John A.—A, Detroit, Mich.
FOCARDI, Pier L.—M, Brooklyn, N. Y.
FORD, Arthur R.—J, Jersey City, N. J.
FORD, Louis R.—M, New York, N. Y.
FRANCIS, Chas. W.—M, Paterson, N. J.
FRANCIS, Thayer—J, Brookline, Mass.
FRANCK, Herman, Jr.—M, Paterson, N. J.
FRANCKE, Wm. J.—M, New Brunswick, N. J.
FRARY, Hobart D.—AM, Madison, Wis.
FREEDLEY, Paul—M, Philadelphia, Pa.
FREIDAY, Jay A.—M, New York, N. Y.
FRENCH, Stuart K.—M, Hog Island, Pa.
FRICK, Clifford H.—AM, Tamaqua, Pa.
FUGON, Earl H.—J, Sewaren, N. J.
FRITSCH, Robert E.—J, Philadelphia, Pa.
FROELICH, Holmes L.—J, Flint, Mich.
FURLOW, Jas. W.—M, Washington, D. C.
FYKSE, Mitchell L.—M, Milwaukee, Wis.
GANG, Oliver F.—J, Boston, Mass.
GANNON, Jesse—AM, Chicago, Ill.
GARMAN, Warren DeW.—AM, Detroit, Mich.
GAY, Lindsley E.—AM, Detroit, Mich.
GAY, Walter C.—J, New York, N. Y.
GAZDA, A. A.—J, Chicago, Ill.
GENEST, Homer A.—M, Hartford, Conn.
GERELITZKI, Harry E.—J, Lancaster, Pa.
GERSEN, Frederick C.—J, Philadelphia, Pa.
GESELL, Egbert G.—AM, New York, N. Y.
GETCHELL, Edw. L.—AM, Durham, N. H.
GILBERT, Chas. N.—J, Philadelphia, Pa.
GILLIARD, Chas. T.—J, Boston, Mass.
GILLIARD, P. G.—J, Williamsport, Pa.
GILMORE, Forrest E.—J, Tulsa, Okla.
GINTER, Geo. E.—M, Bayonne, N. J.
GLAUCH, Edmund S.—J, Harrisburg, Pa.
GLEW, Jas. S.—M, Toledo, O.
GODHOLD, Louis A.—M, Houston, Tex.
GOLDRICK, Albert R.—AM, Cleveland, O.
GOOD, Chas. W.—J, Ann Arbor, Mich.
GOODMAN, Lester L.—J, Brooklyn, N. Y.
GORDON, Myron B.—J, New York, N. Y.

GOUGH, Wm. E.—AM, Shelton, Conn.
GOWLING, Lawrence E.—AM, Havana, Cuba.
GOYNE, Wm. J.—AM, New York, N. Y.
GRAMMER, Reynold A.—J, Boston, Mass.
GRANGER, Gordon T.—AM, Burkburnett, Tex.
GREENLEE, Wm. B.—A, Chicago, Ill.
GREENWOOD, Jos. R.—M, New York, N. Y.
GREGORY, Guy—A, New York, N. Y.
GREGORY, Wm. K.—AM, Louisville, Ky.
GRIDLEY, Allen H.—AM, New York, N. Y.
GRIFFIN, W. A.—M, Buffalo, N. Y.
GRUBE, Lester E.—AM, Lynn, Mass.
GUETH, Oswald—M, Washington, D. C.
GUIDER, John F.—M, Buffalo, N. Y.
GULLAK, John H.—M, Harriman, Pa.
GUMAER, Pierre L.—J, Bayonne, N. J.
GUY, Robert P.—AM, Hartford, Conn.

HAGHERG, Eric E.—M, Neuss, Germany.
HAHN, Clifford A.—AM, Columbus, O.
HALER, Percy J.—M, Leyton, Essex, England.
HALL, Alexander D.—J, Detroit, Mich.
HALL, Irving G.—J, Waynesboro, Pa.
HALLER, Henry E.—M, Pittsburgh, Pa.
HALPIN, Bernard S.—A, Bridgeport, Conn.
HAMILTON, George G.—M, Harrison, N. J.
HAINES, Elmer B.—J, Hartford, Conn.
HANKINS, Frank W.—J, Auburn, N. Y.
HARDING, Geo. W.—AM, Indian Head, Md.
HARKINS, Henry Drake—J, Warren, O.
HARMON, Hoyt H.—AM, Naugatuck, Conn.
HARPER, Arthur C.—M, Urbana, Ill.
HARRISON, James H.—J, Buffalo, N. Y.
HARRISON, Thomas L.—AM, Wilmington, Del.
HART, Edwin J.—AM, Philadelphia, Pa.
HART, Nelson W.—A, Holyoke, Mass.
HART, Thomas G.—J, Chicago, Ill.
HARTMAN, Geo. H.—AM, Toledo, Ohio.
HARTANGT, Horace J.—J, Tulsa, Okla.
HARTWICK, Louis M.—M, Low Moor, Va.
HARVICE, King A.—M, New York, N. Y.
HASHAGEN, John B.—J, El Paso, Texas.
HASKINS, Manly K.—AM, Lorain, O.
HAYNES, Elwood—M, Kokomo, Ind.
HAYWARD, Henry W.—J, Charlotte, N. C.
HEADSON, Frank A.—M, Milwaukee, Wis.
HECKMAN, James C.—M, Boston, Mass.
HEENAN, John Nelson D.—J, London, Eng.
HELMICK, Walter E.—J, San Francisco, Calif.
HELT, Harry C.—AM, Chicago, Ill.
HENDERSON, Alfred E.—J, Albany, N. Y.
HENRY, Addison B.—J, New Haven, Conn.
HENRY, John M.—AM, Hartford, Conn.
HENRY, Otto H.—J, Brooklyn, N. Y.
HENSEL, Siegfried R.—J, Jersey City, N. J.
HENTHORN, Arthur L.—AM, Sherbrooke, Quebec, Canada.
HERNDON, Parrish T.—J, City Point, Va.
HERZOG, Ralph W.—AM, New Haven, Conn.
HEWES, Oliver P.—AM, Arlington, N. J.
HIBBARD, Merrill—M, Columbus, O.
HILDEBRAND, H. Edward—J, Newburgh, N. Y.
HILDRED, John W.—A, St. Paul, Minn.
HILDRETH, Ned E.—M, Kansas City, Mo.
HILLER, Paul W.—J, Carbondale, Pa.
HILTON, Harold R.—M, Los Angeles, Calif.
HOBBS, Elmer E.—AM, Philadelphia, Pa.
HODGDON, Donald F.—J, Baltimore, Md.
HOELZEL, Otto—AM, New Haven, Conn.
HOFFMAN, Rovert J.—M, New York, N. Y.
HOLLY, Worrell H.—J, Atlanta, Ga.
HOLZ, Robert—J, Cincinnati, O.
HOOK, Ira T.—M, Detroit, Mich.
HOOPES, Penrose R.—AM, Philadelphia, Pa.
HOOVER, H. Earl—AM, Chicago, Ill.
HOPKINS, Frank H.—M, Boston, Mass.
HORNBROOK, Ralph D.—AM, Detroit, Mich.
HOSMER, Asa—AM, Charlotte, N. C.
HOUGHTON, Carl R.—Connorsville, Ind.
HOVEY, William F.—M, New York, N. Y.
HOWELL, Edward N.—J, Portsmouth, Va.
HOWELL, William G.—J, Philadelphia, Pa.
HOWLETT, Charles A. S.—M, Utica, N. Y.
HUBBARD, George M.—M, Oakland, Calif.
HUBBELL, Henry W.—J, Philadelphia, Pa.
HUHLER, David V.—J, West La Fayette, Ind.
HUBLEY, Geo. W.—M, Louisville, Ky.
HUDSON, Ray N.—AM, Terre Haute, Ind.
HUGHES, Charles W.—J, Yonkers, N. Y.
HUNISCKER, Charles R.—M, Akron, O.
HUNTER, Francis W.—J, Trenton, N. J.
HUNTSBERGER, Russell C.—AM, Middleton, O.
HUTCHINSON, Arthur E.—A, St. Louis, Mo.
HVOSLEF, Frederick W.—J, Detroit, Mich.

IMMEDIATO, Gerardo—M, Brooklyn, N. Y.
INFIORATI, Jr., Matteo E.—AM, New London, Conn.
INGERSOLL, Charles B.—M, Cleveland, Ohio.
INGLE, Henry W.—AM, Hartford, Conn.
INMAN, Edward R.—M, Franklin, Pa.
JACKA, Edwin B.—M, Baltimore, Md.

JACKSON, Chas. H.—AM, Milwaukee, Wis.
JACOBI, Edw. W.—M, Brooklyn, N. Y.
JAQUES, Russell—J, New York, N. Y.
JAROH, Wilhelm—AM, Los Angeles, Cal.
JENSEN, Scot—J, West Homestead, Pa.
JIMERSON, Francis A.—AM, Athens, Pa.
JOHNSON, Alfred V.—AM, New York, N. Y.
JOHNSON, B. F. S.—M, Worcester, Mass.
JOHNSON, Fred V.—M, Philadelphia, Pa.
JOHNSON, John T.—AM, Barberton, Ohio.
JOHNSON, M. J.—M, East Auburn, Cal.
JONES, Malvern S.—AM, Detroit, Mich.
JONES, Forrest E.—AM, El Dorado, Kan.
JONES, Hobart B.—J, New Britain, Conn.
JONES, Paul T.—M, Corinth, Miss.
JONES, Spencer A.—AM, New York, N. Y.
JORDAHL, Arne—AM, Chicago, Ill.
JORDAN, John P.—M, New York, N. Y.
JORGENSEN, Olav E.—M, New York, N. Y.
JOSELOWITZ, Harry A.—AM, Minneapolis, Minn.
JOYCE, Chas. V.—J, Hyattsville, Md.
KAYSER, Wendell H.—J, Endicott, N. Y.
KEAT, William G.—J, Washington, D. C.
KIEFER, Carl J.—M, Cincinnati, Ohio.
KEMP, Chester S.—AM, Syracuse, N. Y.
KENDALL, Howard C.—M, New York, N. Y.
KENNEDY, Fred T., Jr.—J, Erie, Pa.
KERR, David J.—AM, Canton, Haywood County, N. C.
KETCHER, Randolph E.—J, New York, N. Y.
KILEY, LeRoy D.—AM, Chicago, Ill.
KIMMEL, Geo. C.—M, Cincinnati, Ohio.
KIMMEY, Harold I.—J, Syracuse, N. Y.
KINCAID, Russell McW.—M, Garden City, L. I., N. Y.
KING, Chas. E.—M, Indianapolis, Ind.
KING, Douglas H.—J, Newark, N. J.
KING, Eldred Lawrence—J, Toledo, Ohio.
KIPPER, Frederick C.—AM, East Orange, N. J.
KLOTZ, Albert W.—J, Williamsport, Pa.
KLOTZ, Edgar L.—J, Fullerton, Pa.
KNOWLES, Harvey C.—AM, New York, N. Y.
KOCHNER, Wm. B.—J, Madison, Ill.
KOEHLER, Percy B.—AM, St. Louis, Mo.
KOENITZ, Arthur C.—AM, Brooklyn, N. Y.
KOPPLEMAN, Morris D.—J, Long Island City, N. Y.
KRAFT, Carl—J, New York, N. Y.
KRAMER, Andrew A.—M, Kansas City, Mo.
KRANE, Leonard J.—J, Chicago, Ill.
KRATZ, Raymond C.—AM, Philadelphia, Pa.
KRAUSE, Edwin E.—M, Springfield, Mass.
KUEHNER, Arthur T.—AM, Baltimore, Md.
KUHL, Robert J.—J, St. Louis, Mo.
LA CASSE, Albert H.—M, Richmond, Cal.
LAIRD, Elmer R.—AM, Chicago, Ill.
LANGFITT, Jos. K.—M, Indianapolis, Ind.
LARKIN, Wm. H., Jr.—A, Butler, Pa.
LARSON, Lloyd E.—AM, New York, N. Y.
LASSMAN, Benj.—AM, Cleveland, Ohio.
LAWRENCE, Chas. M.—AM, New York, N. Y.
LE BLOND, Harold R.—J, Cincinnati, Ohio.
LEE, Maynard De W.—AM, Rochester, N. Y.
LEH, Howard H.—AM, Nazareth, Pa.
LESLIE, Herbert—J, Elizabeth, N. J.
LESSIG, Hilary M.—M, Pottstown, Pa.
LEVENTHAL, Lewis F.—J, Hartford, Conn.
LEWIS, Chas. McL.—J, Milwaukee, Wis.
LEWIS, Samuel H.—M, New York, N. Y.
LIEBOWITZ, Benj.—AM, New York, N. Y.
LINDNER, Karl A.—AM, New York, N. Y.
LINDSAY, Alexander—M, Spokane, Wash.
LINDSTROM, Arthur W.—AM, Cudahy, Wis.
LLOYD, Linnel P.—J, Philadelphia, Pa.
LOEW, Chas. F.—A, Cleveland, Ohio.
LOVETTE, Stanislaus A.—AM, Roanoke, Va.
LUDERS, Richard E.—J, Pt. Arthur, Tex.
LUKENS, Wm. H.—AM, Bethlehem, Pa.
LUND, Nels B.—J, Brooklyn, N. Y.
LUNDELL, Geo. A.—M, New York, N. Y.
LUNDQUIST, Arvid—AM, Brooklyn, N. Y.
LUNOY, W. N. L.—J, Cincinnati, Ohio.
LYON, Jas. F.—A, Providence, R. I.
LYNNS, Wm. H.—AM, Lorain, Ohio.
McBRIDE, Wm. J.—M, Lynn, Mass.
McCAHE, Frank E.—M, Cleveland, Ohio.
McCALL, Roger F.—J, Annapolis, Md.
McCARTHY, John P.—J, West New York, N. J.
McCULLOUGH, Wm. T., Jr.—J, Cincinnati, Ohio.
McDONALD, Donald—M, New York, N. Y.
McDOUGALL, Eric W.—AM, Brooklyn, N. Y.
McEWEN, John D.—J, Warren, Ohio.
McGIRR, Theo. G.—M, Springfield, Mass.
McKEE, Willis—M, Cleveland, Ohio.
McKINLEY, Wm. A.—J, Detroit, Mich.
McLAUGHLIN, Carl D.—J, Wollaston, Mass.
McLEAN, Embury—M, New York, N. Y.
McMANANY, Frank—M, Washington, D. C.
McNAIR, Charles—A, Franklin, Pa.
McNALLY, Keenan J.—J, New York, N. Y.

McNEELY, Harry B.—J, Indianapolis, Ind.
McQUEENEY, Jas. T.—J, New Haven, Conn.
McVETTY, Percy G.—J, Pittsburgh, Pa.
MacWATTY, Frank L.—J, Hasbrouck Heights, N. J.
MALAHAN, Jas. T.—AM, Thomaston, Conn.
MANTONYA, Wm. G.—J, Chicago, Ill.
MARCALUS, Nicholas.—J, Plainfield, N. J.
MARCELLUS, Roy C.—M, Victoria, Australia.
MARGUARDT, Wm. C.—J, Troy, N. Y.
MARSHALL, Lawrence P.—J, Worcester, Mass.
MARTIN, Chas. H.—M, Springfield, Mass.
MARTIN, Evan S.—M, Toronto, Ont., Canada.
MATSON, Clifford H.—AM, Ft. Wayne, Ind.
MATTHEWS, Reginald G.—J, Orange, N. J.
MATTINGLY, Geo. B.—AM, Edge Moor, Del.
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MAY, Elliot D.—J, Winchendon, Mass.
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MELICK, Neal A.—M, Newark, N. J.
MERCER, Leonard B.—AM, Tiffin, Ohio.
MERKER, David.—J, New York, N. Y.
MERO, Joseph M.—J, New York, N. Y.
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MERRIMAN, Merle E.—AM, Chicago, Ill.
MEYER, Peter.—AM, Newark, N. J.
MILLER, Charles F.—M, Providence, R. I.
MILLER, Harry G.—AM, Milwaukee, Wis.
MILLER, Robert N.—M, San Francisco, Cal.
MILLS, Frank H.—AM, Frankford, Phila. Pa.
MINER, Nelson A.—AM, Riverton, Ill.
MONAHAN, Thomas G.—AM, Pittsburgh, Pa.
MONTANES, Charles E.—M, Barcelona, Spain.
MONTESER, Walter R.—M, New York, N. Y.
MONTGOMERY, George A.—J, Yonkers, N. Y.
MOODY, Howard.—AM, New Orleans, La.
MORELAND, Albert S.—J, Thompsonville, Conn.
MORRIS, Dwight B.—J, Gibbstown, N. J.
MORRIS, Thomas E.—AM, Springfield, Mass.
MORRIS, William C.—AM, Easton, Pa.
MORRIS, Wm. O.—J, Hartford, Conn.
MORRISS, Arthur D.—AM, New York, N. Y.
MORRISSEY, Ray L.—J, Cincinnati, Ohio.
MORT, Wm.—M, New York, N. Y.
MORTIMER, James D.—M, New York, N. Y.
MUELLER, Max W.—M, York, Pa.
MUNROE, Ed. K.—M, Baltimore, Md.
MURRAY-SCOTT, John.—M, Sydney, N. S. W., Australia.
NASH, Carleton B.—J, Scranton, Pa.
NAYLOR, George M.—M, New York, N. Y.
NEEDHAM, Robert J.—M, Verdun, Quebec, Canada.
NELSON, Minton S.—J, Saginaw, Mich.
NELSON, Swen W.—J, Cleveland, Ohio.
NETTLETON, George H.—J, New York, N. Y.
NEUBER, George H.—J, Philadelphia, Pa.
NEUBOLD, Richard S.—M, Philadelphia, Pa.
NEWBURY, Robert C.—AM, Denver, Col.
NEWCOMB, Raymond.—J, New York, N. Y.
NEWELL, Harry B.—M, Pittsburgh, Pa.
NEWILL, George E.—M, Amherst, Nova Scotia, Canada.
NEWMAN, J. P.—M, New Britain, Conn.
NICHOL, Alfred H.—J, Detroit, Mich.
NORDEN, Henry F.—J, Newport News, Va.
NORTON, Edgar W.—M, Worcester, Mass.
NORTON, Howard C.—J, Elizabeth, N. J.
NORTON, William T., Jr.—M, Camp Holabird, Md.
NUGUE, Pierre.—M, New York, N. Y.
OBLER, David M.—AM, Hastings-on-Hudson, N. Y.
O'CONNOR, John F.—M, Chicago, Ill.
O'HARA, George D.—M, San Francisco, Cal.
OLSEN, Gustur E.—J, New York, N. Y.
OPINSKY, John E.—J, Pittsburgh, Pa.
ORPIN, Francis W.—AM, Montevideo, Uruguay, S. A.
PAGE, Arvin.—J, Palmerton, Pa.
PAINE, Arthur P.—AM, New Haven, Conn.
PAISLEY, John K.—J, West Lynn, Mass.
PANFIL, Anthony C.—J, Detroit, Mich.
PANGBORN, Robert G.—J, Philadelphia, Pa.
PARKER, Frederic T.—M, Richmond, Surrey, England.
PARSONS, Munroe H.—J, Bayonne, N. J.
PATERSON, Albert B.—M, New Orleans, La.
PEASE, Giles S.—M, Worcester, Mass.
PECK, Edward L.—AM, Bartlesville, Okla.
PENDER, Winfield R.—AM, Houston, Texas.
PENMAN, Walter R.—J, Lebanon, Pa.
PERRY, Clarence C.—M, Hartford, Conn.
PERRY, Harry M.—AM, Los Angeles, Cal.
PETERS, Joseph W.—AM, St. Louis, Mo.
PETERSON, John B.—J, Washington, D. C.
PETITJEAN, Charles P.—M, Paris, France.
PETTY, Earl.—J, New York, N. Y.
PFAHLER, Frederick P.—M, Washington, D. C.
PHILLIPS, John C.—AM, New York, N. Y.
PIKE, Lorenzo H.—M, Brooklyn, N. Y.
PLAPP, Elmer B.—J, Pittsburgh, Pa.
PLATE, Harry V.—AM, Byng, Oklahoma.
PLATE, Henry D.—AM, Decatur, Ill.
PLATT, Frank L.—AM, New York, N. Y.
POMEROY, G. M.—J, Worcester, Mass.
PORKER, Harry—J, New Britain, Conn.
PORTER, Robert B.—J, Bridgeport, Conn.
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POTTER, Carl H.—AM, Passaic, N. J.
POTTER, Erford M.—AM, New York, N. Y.
POTTER, Robert E.—M, Kittery, Me.
POTTS, William K.—J, Sacramento, Cal.
POUKEN, Eugene—AM, Menominee, Mich.
PRADO, Jose de J.—M, New York, N. Y.
PRATT, Everard S.—A, Newark, N. Y.
PRICE, John C.—M, Springfield, Vt.
PRICE, Stephen W.—AM, Philadelphia, Pa.
PRINCE, Warren F.—J, Lowell, Mass.
QUATTLEBAUM, Harrold H.—J, Newman, Ga.
QUEISSER, Charles F.—AM, Cleveland, Ohio.
QUESNEL, Nicholas W.—A, Toronto, Canada.
RABEZZANA, Hector—M, Flint, Mich.
RACK, Edgar C.—J, Newark, N. J.
RAE, Frank B.—M, Cleveland, Ohio.
RAMSEY, Clifford H.—M, Paterson, N. J.
RAPP, Axel G. J.—M, Chicago, Ill.
RAWLINGS, Frederick G.—AM, Providence, R. I.
RAYMOND, Raymond P.—AM, Bridgeport, Conn.
REID, Neil K.—J, Alliance, Ohio.
REIMER, Frank H.—J, Wilmington, Del.
REINERT, George L.—AM, Fairfield, Ala.
RETTERER, Ray W.—J, Beechgrove, Ind.
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RICE, Chester L.—A, New York, N. Y.
RICE, F. Edgar—M, Bartlesville, Okla.
RICH, Clarence D.—AM, Toledo, Ohio.
RICHARDSON, Henry A.—AM, Brooklyn, N. Y.
RINEHART, Alfred W., Jr.—AM, Pittsburgh, Pa.
RITCHINGS, Harold E.—J, Newark, N. J.
ROBBINS, William F.—AM, Faneuil, Mass.
ROBERT, John—AM, Chicago, Ill.
ROBERTS, Deering S.—AM, Boston, Mass.
ROBERTS, James Frank—J, Milwaukee, Wis.
ROBERTSON, John D.—J, New Haven, Conn.
ROCKENFIELD, Wm. Albert—AM, Worcester, Mass.
ROBINSON, Merrill P.—AM, New York, N. Y.
ROBINSON, Samuel M.—M, San Francisco, Cal.
ROCKWELL, John H.—J, New York, N. Y.
ROGERS, Howard H.—AM, Moline, Ill.
ROSE, Harold McN.—AM, Huntington, Pa.
ROSENBERG, Sidney—M, New York, N. Y.
ROSS, John O.—M, Hyde Park, Mass.
ROWE, Louis G.—AM, Gloucester, Mass.
ROSSOE, Olav C.—AM, Seattle, Wash.
RUGG, Harry M.—M, Melrose, Mass.
RUSDEN, Ethelbert A.—M, Providence, R. I.
RUSSELL, William J.—AM, Irvington, N. J.
RYAN, James H.—AM, Springfield, Mass.
SAGO, Hamilton R.—J, Atlanta, Ga.
SALISBURY, Frank W.—M, Parkersburg, West Va.
SALLEE, Hubert B.—J, Seattle, Wash.
SASS, Harvey M.—J, Grand Rapids, Mich.
SAUZEDDE, Claude—M, Mount Clemens, Mich.
SAUER, Herbert O.—AM, Baltimore, Md.
SAVAGE, Harlow D.—M, New York, N. Y.
SAWYER, Clarence B.—M, Boston, Mass.
SAXON, Ruben B.—J, Lincoln, Neb.
SBURLINO, Pascal—AM, Bridgeport, Conn.
SCHAFFNIT, William E.—J, Philadelphia, Pa.
SCHANCK, Harry S.—J, New York, N. Y.
SCHANK, Harry E.—J, New York, N. Y.
SCHARNBERG, Herman J. B.—M, Long Island, N. Y.
SCHEDE, Julius W.—J, New Brunswick, N. J.
SCHILLING, Peter G.—M, New York, N. Y.
SCHIRMER, Gustar—AM, Detroit, Mich.
SCHOENWALD, Otto H.—AM, Ponca City, Okla.
SCHOONMAKER, Herbert S.—J, New York, N. Y.
SCHORLING, Henry F.—J, Elizabeth, N. J.
SCHWARTZ, Walter M.—M, Philadelphia, Pa.
SCOTT, Abraham L.—J, Yonkers, N. Y.
SCOTT, Herbert Van W.—J, Paterson, N. J.
SCOTT, Walter C., Jr.—J, Washington, D. C.
SCOTT, Walter Clem—J, Washington, D. C.
SEAMANS, E. J.—AM, Watervliet, N. Y.
SEE, James S.—AM, Bay City, Mich.
SEELIGSBERG, Leonard W.—AM, New York, N. Y.
SEILER, George W.—AM, Lockport, N. Y.
SHACKLETON, Roy—M, Chicago, Ill.
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SHERWOOD, Edward L.—AM, New York, N. Y.
SHERWOOD, Lyman W.—J, Coraopolis, Pa.
SHMIED, Ernest A.—J, Sioux City, Iowa.
SHORKEY, Fred A.—AM, Essington, Pa.
SHUTE, Frederick W.—AM, Boston, Mass.
SIMCOCK, John H.—AM, Boston, Mass.
SIMONDS, Frank A.—AM, Grand Rapids, Mich.
SIMPSON, Frederick—AM, Washington, D. C.
SINGLETON, Palmer C.—J, Bethlehem, Pa.
SINSHEIMER, Warren A.—AM, New York, N. Y.
SITTINGER, Carl J.—AM, Fall River, Mass.
SKELDON, David F.—AM, Toledo, Ohio.
SMEAD, H. A.—AM, Los Angeles, Cal.
SMITH, A. T.—AM, Newport News, Va.
SMITH, Charles R.—J, New York, N. Y.
SMITH, Frank W.—J, Brooklyn, N. Y.
SMITH, George P., Jr.—AM, Philadelphia, Pa.
SMITH, Hoxsie Y.—AM, Pasadena, Cal.
SMITH, Marshall C.—J, Philadelphia, Pa.
SMITH, Ralph R.—J, Syracuse, N. Y.
SMITH, Samuel A.—J, Buffalo, N. Y.
SMITH, Warren P.—J, New Haven, Conn.
SMITH, Wells B.—M, Bridgeport, Conn.
SMYTH, Harry K.—AM, New York, N. Y.
SNYDER, William—M, Tate, Ga.
SNYDER, Howard O.—J, San Francisco, Cal.
SNYDER, William F.—AM, Stevens Point, Wis.
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SOMERS, Bruce X.—J, Hartford, Conn.
SOMERS, Richard H.—M, New Britain, Conn.
SOMMER, William B.—AM, St. Paul, Minn.
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SPARLING, Eric C.—AM, Brooklyn, N. Y.
SPENCE, Paulsen—J, Detroit, Mich.
SPREEN, Charles C.—J, Warren, Ohio.
SPENCER, George H.—J, Lyndhurst, N. J.
SPIEGEL, Samuel—J, Bayonne, N. J.
SRINIVAS-AIENGAR, K.—M, Bangalore City, S. India.
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STALL, Earl R.—J, Greenville, S. C.
STEARNS, Frederick A.—J, Cambridge, Mass.
STEINDE, Emanuel—J, New York, N. Y.
STETTLER, Ray M.—J, Elizabeth, N. J.
STEVENSON, Francis E.—M, Mt. Gilead, Ohio.
STOVER, Charles C.—M, Providence, R. I.
STOWE, Loyd R.—M, St. Louis, Mo.
STOWELL, Austin L.—J, Shelton, Conn.
STRANGMAN, Warren A.—J, Boston, Mass.
STROCK, Earl J.—AM, Portland, Colo.
STRONG, Robert G.—J, Oil Hill, Kan.
STUCKERT, Felix J.—J, Milwaukee, Wis.
STUNZI, Jean Jaques—M, Lancaster, Pa.
SULLIVAN, Edward L.—AM, Boston, Mass.
SULLIVAN, George L.—M, Santa Clara, Cal.
SUTTON, Samuel P.—AM, Akron, Ohio.
SVENSON, Carl L.—M, Columbus, Ohio.
SWANSON, Joseph L.—M, New Orleans, La.
SYLVAIN, Chas. E. B.—AM, Rio de Janeiro, Brazil.
SYLVANDER, Roy C.—J, Washington, D. C.
TANNER, Julius R.—M, Pittsburgh, Pa.
TERRY, Seymour—M, Honolulu, T. H.
THAYER, Wm. B.—M, Columbus, Ga.
THOENE, Fred A.—J, Graselli, N. J.
THOMAS, Fielder W.—M, Cleveland, Ohio.
THOMPSON, Geo. B.—J, Hartford, Conn.
THOMPSON, Leroy H.—AM, Manila, P. I.
THOMPSON, Stephen G.—M, Cleveland, Ohio.
THWING, Leroy L.—AM, Boston, 34, Mass.
TILLMAN, John R.—M, Bridgeport, Conn.
TIPTON, Warren A.—J, Dallas, Tex.
TJEENK-WILLINK, Alex. H. J.—M, Oilfields, Cal.
TOLLEY, Clinton G.—AM, Cambridge, Mass.
TONNE, Carl A.—J, Rochester, N. Y.
TOTTIS, Theodore J., Jr.—J, New York, N. Y.
TOWERS, Donigan D.—M, Baltimore, Md.
TOWSON, Joseph P.—J, Baltimore, Md.
TREWIN, Frank H.—J, Boston, Mass.
TRIPP, Burton H.—M, San Francisco, Cal.
TRIPP, Edwin P.—M, Springfield, Mass.
TROOP, Eugene F.—AM, Joanna, Berks Co., Pa.
TRUHAN, Lewis J.—J, Philadelphia, Pa.
TRULL, Frederick G.—AM, Toronto, Ontario, Can.
TSUJII, Makato—AM, New York, N. Y.
TULL, M. Graham—J, Davids, Pa.
TYLER, Joseph B.—AM, Carney's Point, N. J.
VAIL, David P.—AM, San Francisco, Cal.
VAN DUSEN, C. Theron—J, Detroit, Mich.
VAN HAMERSVELD, John J. N.—AM, Cleveland, Ohio.
VASSELLI, Anthony J.—AM, Newark, N. J.
VIALL, Wendell P.—J, Waterbury, Conn.
VIGELIUS, F. W.—J, Easton, Pa.
VOLTMANN, Henry J. N.—AM, New York, N. Y.
VON ROTZ, Robert—J, Cincinnati, Ohio.
WAGNER, Geo. E., Jr.—J, Tulsa, Okla.
WALKER, George E.—J, New York, N. Y.
WALLS, Alfred J., Jr.—J, New York, N. Y.
WALTON-CRANFORD, Wilbert—J, New Haven, Conn.
WALTON, Druid A.—M, Louisville, Ky.
WANS, Oswald—M, Lincoln, Eng.

WARD, Wm. D.—M, New York, N. Y.
WARE, Arthur L.—AM, Hazard, Ky.
WARE, Charles L.—M, Lawrence, Mass.
WARMINGTON, Thomas J.—J, Saginaw, Mich.
WARNOCK, Harry R.—M, Chicago, Ill.
WARREN, Francis W.—M, Paris, France.
WARTHEN, Harry J.—M, Richmond, Va.
WATERMAN, Donald F.—J, New York, N. Y.
WATERMAN, John H.—M, Boston, Mass.
WATSON, Harold F.—AM, Narberth, Pa.
WATSON, M. B.—AM, Toronto, Ontario, Can.
WATTS, Kenneth—AM, Tulsa, Okla.
WEAVER, Chas. W.—AM, Charleston, S. C.
WEAVER, Ernest E.—J, Bronx, N. Y.
WEBER, Rudolf L.—M, Kansas City, Mo.
WEBSTER, Harold S.—J, Langley Field, Va.
WEDDELL, Ralph R.—J, Chicago, Ill.
WEEKS, W. C.—M, Fort Sam Houston, Texas.
WEINE, Clyde R.—AM, Star Junction, Pa.
WEILAND, Walter F.—J, Pittsburgh, Pa.
WEINER, Charles M., Jr.—J, Easton, Pa.
WEISSBACH, Edward A.—J, St. Louis, Mo.
WELDON, P. Lawrence—J, Grandmere, Quebec, Can.
WELCH, Robert J. M.—AM, Elizabeth, N. J.
WELSER, G. Brinton, Jr.—AM, Milwaukee, Wis.
WERNER, Elmer L.—J, Kansas City, Mo.
WERSANT, Peter D.—J, Minneapolis, Minn.
WHEELER, Dudley I.—A, Lakewood, Ohio.
WHEELER, Jay C.—AM, Wellsville, N. Y.
WHEATON, Egbert A.—AM, Allston, Mass.
WHELAN, Roderick J.—AM, Elyria, Ohio.
WHITELEY, Stockett M.—AM, Baltimore, Md.
WICKERS, Arthur T.—J, Garfield, N. J.
WILLIAMS, Albert H.—AM, Orange, N. J.
WILLIAMS, Charles H.—M, Litchfield, Ill.
WILLIAMS, David C.—AM, Allentown, Pa.
WILLIAMS, Edgar H.—M, Portsmouth, N. H.
WILLIS, Charles C.—M, Framingham, Mass.
WILLIS, Richard M.—J, Mobile, Ala.
WILLOUGHBY, Geo. A.—J, Saginaw, Mich.
WILLSON, Geo. T.—M, Poughkeepsie, N. Y.
WILSON, Charles H.—AM, Dallas, Texas.
WOEHRLE, Ernest A.—J, New York, N. Y.
WOLF, W. Dale—AM, Columbus, Ohio.
WOLF, Julius—J, Lexington, Ky.
WOLFE, Jay Austin—AM, Columbus, Ohio.
WOLFERG, Edwin C.—J, Seattle, Wash.
WOODWARD, Edgar L.—A, New York, N. Y.
WOODWARD, Francis A.—J, Washington, D. C.
WOSTREL, John F.—J, Boston, Mass.
WRIGHT, Daniel K.—M, Paterson, N. J.
WRIGHT, James A.—AM, Detroit, Mich.
WRIGHT, James C.—AM, Olathe, Kan.
WRIGHT, Thomas C.—J, Philadelphia, Pa.
WUNDERLICH, Milton S.—J, St. Paul, Minn.
WURGEL, Rena A.—J, Dallas, Texas.
WYNKOOP, Alfred H.—A, Philadelphia, Pa.
WYSE, Francis O.—J, Cambridge, Mass.
YAO, Kwang Y.—J, Philadelphia, Pa.
YATES, Edwin T.—AM, Newark, N. J.
YODER, Howard D.—M, Detroit, Mich.
YOPP, Paul R.—J, Atlanta, Ga.
YOUNG, William R.—J, Bridgeport, Conn.
ZACHOW, Clarence W.—M, Fond du Lac, Wis.
ZEPFLER, Louis H.—J, Elizabeth, N. J.
ZERBEY, Arthur L.—J, Kingston, Pa.
ZIMMERMAN, William F.—J, Philadelphia, Pa.
ZWINGLI, Carl T.—J, Paterson, N. J.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER OCT. 18, 1920

Below is a list of candidates who have filed applications since the date of the last issue of Mechanical Engineering. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 182.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. **All correspondence in this regard is strictly confidential. Unless objection** is made to any of the candidates by Oct. 18, 1920, and provided **satisfactory replies have been received from the required number of references,** they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

GAINES, Walter S., Chief Engineer, Mobile Tractor Co., Mobile

California

SCOTT, John, Oakland
SKAIFE, Arthur F., Sales Engineer, Spencer Elevator Co., San Francisco
TOWNE, Ralph E., Senior Electrical Engineer, Interstate Commerce Commission, San Francisco

Colorado

KROUSE, Robert L., Colorado Springs
RHOADS, Burt L., Chief Engineer, Gates Rubber Co., Denver

Connecticut

CLARKSON, William F., Gauge Checker, Columbia Graphophone Co., Bridgeport
FAY, Samuel W., Mechanical Engineer, Columbia Graphophone Mfg. Co., Bridgeport
FOSTER, Charles B., Designer & Assistant to Mechanical Engineer, Bridgeport Brass Co., Bridgeport
GEARING, Charles M., Division Manager, New Departure Mfg. Co., Meriden
HOMAN, William C., Master Mechanic, Edw. Miller & Co., Meriden
JARVIS, Marshall N., President & Treasurer, The Chas. L. Jarvis Co., Gildersleeve
STEVENSON, George K., Superintendent, Henry G. Thompson & Son Co., New Haven
TELLER, S. Jay, Head of Patent Department, Niles-Bement-Pond Co., Hartford
THOMPSON, F. Archer, Chief of Equipment Dept., Bullard Machine Tool Co., Bridgeport
WOOD, George E., Supervisor of Power Plants, The Connecticut Co., New Haven

Delaware

SCHOCH, Norman H., Research Engineer, Hercules Power Co., Wilmington

Georgia

BURFORD, Robert A., Jr., Treasurer, Burford Hall & Smith, Atlanta
DUPEE, Charles F., Chief of Mechanical Dept., Robert & Co., Atlanta
HURTT, William T., Special Sales Engineer, District Office, Westinghouse Electric & Mfg. Co., Atlanta
JONES, David C., Jr., Design and Fire Prevention Engineer, Georgia Railway & Power Co., Atlanta
MEADE, Norman G., Editor, Southern Engineer, Atlanta
NUNAN, Thomas R., Sales Engineer, Armstrong Cork & Insulation Co., Atlanta

Illinois

ARTHUR, Paul, Supervisor Industrial Engineering, L. V. Estes, Inc., Chicago
BECK, Milton, Vice-President, The Page Co., Chicago
COLBECK, Fred W., Manufacturing Engineer, Western Electric Co., Inc., Chicago
HOGE, Frederick H., Manager Speed Reducer Dept., W. A. Jones Foundry & Machine Co., Chicago
TILBURY, S. Ray, Mechanical Engineer, The Lewis Draft Appliance Co., Chicago

Indiana

ERNST, Henry S., Chief Gauge Designer, Nordyke & Marmon Co., Indianapolis
KOCH, Charles E., 2nd Assistant to Master Mechanic, Standard Oil Co., Whiting
NEEDHAM, Howard H., Assistant Master Mechanic, American Bridge Co., Gary
WARRICK, Woodward A., Experimental Engineer, Diamond Chain & Mfg. Co., Indianapolis

Louisiana

DAY, Donald M., Plant Engineer, New Orleans Refining Co., Sellers
DELEIG, Eugene F., Assistant Engineer, Sewerage & Water Board, New Orleans
JONES, John T., Assistant Manager, Godchaux Sugars, Inc., New Orleans
KLIPPEL, George H., Engineer, The Foundation Co., New Orleans

Maryland

BIRD, Charles T., District Sales Engineer, Pangborn Corpn., Hagerstown

Massachusetts

ALLEN, Lawrence J., Superintendent, Miller Candy Co., Roxbury
BOLLES, Frederick N., Senior Member, Bolles & Dwyer, Boston
COVE, Charles H., Master Mechanic & Engineer, Warren Cotton Mills, West Warren
DWYER, James P., Jr., Consulting Engineer, Bolles & Dwyer, Boston
EDDY, Lloyd C., Instructor, Franklin Union, Boston
ELLIOTT, Edward, Assistant Chief Engineer, Osgood Bradley Car Co., Worcester
GREENE, Ralph S., Production Manager, Frank Mossberg Co., Attleboro
HORGAN, Patrick J., Foreman Exp. Draftsman, United Shoe Machinery Corpn., Beverly
LITTLE, William R., Manager Boston Office, Bailey Meter Co., Boston
LUTHER, Benjamin S., Engineer, Stone & Webster, Boston
McLAUGHLIN, George E., Mechanical Engineer, The Turner Tanning Machinery Co., Peabody
REED, Alonzo B., Member & Engineer, Deerben Engineering Associates, Boston
SCHEM, Augustus R., Assistant District Manager, John A. Stevens, Fall River
WALDRON, Everett H., Mechanical Superintendent, Mount Hope Finishing Co., North Dighton
YEATON, Philip O., Instructor in Mechanical Engineering, Lowell Textile School, Lowell

Michigan

FORBATH, Elmer F., Squad Leader, Lockwood, Greene & Co., Detroit
FURLONG, Harold P., Detroit
GRAY, William E., Master Plumber & Steam Fitter, Gray & Moss, Saginaw
GUMPPER, Harold D., Sales Engineer, The Lakewood Engineering Co., Detroit
HAMILTON, Charles A., Fargo Engineering Co., Jackson
HOLLIS, Oliver N., Engineer, Detroit Edison Co., Detroit
HOPKINS, Ralph Z., Assistant Plant Superintendent, Hudson Motor Car Co., Detroit
KENDRICK, Warren F., Designing Engineer, Ford Motor Co., Detroit
PAULINS, Frank U., Tool Engineer & Manufacturing Engineer, Oakland Motor Car Co., Pontiac
PEARS, Richard W., Draftsman, Clark Equipment Co., Buchanan
PRESCOTT, Curry S., Vice-President and Manager, Pumping Engine Department, The Prescott Co., Menominee

Minnesota

CROSBY, Charles W., Mechanical Engineer, Mutual Automobile Association, Inc., St. Paul
IRWIN, VINCENT H., Boiler Room Engineer, Twin City Rapid Transit Co., Minneapolis
JONES, Edwin F., Mechanical Engineer, Charles L. Pillsbury Co., St. Paul
LEWIS, Robert D., Vice-President, The George M. Kenyon Co., St. Paul

Missouri

CARPENTER, Samuel D., Employment Manager & Assistant to Superintendent, Busch Sulzer Bros. Diesel Engineering Co., St. Louis

New Hampshire

WELLS, Harry A., Partner, Larson & Wells, Hanover

New Jersey

ARES, Robert R., Maintenance Machinist, E. I. Dupont de Nemours, Arlington
BRIETENFELD, Frederick, Instructor, Dept. of Mechanical Engineering, Stevens Institute of Technology, Hoboken
GREENE, Laurence H., Production Manager, Oxweld Acetylene Co., Newark
PFEIL, Walter G., Superintending Engineer, Botany Worsted Mills, Passaic
TAYLOR, Philip B., Montclair

VANDER KLOSTER, CORNELIUS, Designer, Edison Storage Battery Co., Orange
WORDEN, BEVERLEY LYON, West Orange

New York

ACKERMAN, FRANK J., Senior Draftsman, Dunlop Tire & Rubber Corpn. of America, Buffalo
APPLEBAUM, SAMUEL B., Assistant Technical Manager, The Permutit Co., New York
BARTON, WARREN H., Designer, American Car & Foundry Co., New York
BECKHORN, WALTER R., Assistant Production Manager, Lidgerwood Mfg. Co., Brooklyn
BELL, HAROLD S., Engineer, Sinclair Consolidated Oil Corpn., New York
BOLTON, WILLIAM R., Assistant Mechanical Engineer, Dwight P. Robinson & Co., New York
BUXBAUM, SAUL L., Marine Designer, Brooklyn Navy Yard, Brooklyn
CARTER, DONALD P., Heating & Ventilating Engineer, Foundation Co., New York
COE, ELBERT H., Chief Draftsman, Willys Corpn., New Process Gear Division, Syracuse
DART, EDWARD W., Manager, Engineering Dept., Johnson & Higins, New York
EVERITT, GEORGE G., Salesman, Mechanical Dept., Whitman & Barnes Mfg. Co., New York
GARDNER, MARVIN B., Engineering Draftsman, American Locomotive Co., Schenectady
GREENWOOD, RICHARD F., Chief Draftsman, Powers Accounting Co., Brooklyn
HOOK, WARREN H., Assistant Professor, Cornell University, Ithaca
JENKINS, THOMAS A., Mechanical Designer, Combustion Engineering Corpn., New York
KLEIN, GEORGE H., Draftsman, Locomotive Feed Water Heater Co., New York
LARGE, FRANK E., Vice-President and Research Engineer, Johnson Rim & Parts Co., Inc., Buffalo
MANGER, PAUL A., Chief Draftsman, Farrel Foundry & Machine Co., Buffalo
MEYER, HERMAN F., Tool Designer & Checker, Sperry Gyroscope Co., Brooklyn
NEXSEN, RANDOLPH H., Electrical Engineer, Public Service Commission, New York
OSOWIECKI, LEE C., Draftsman, The Beaver Board Companies, Buffalo
PRENDERGAST, RICHARD F., Operating Engineer, New York Edison Co., New York
PROBST, GEORGE R., Testing Engineer, Moore Steam Turbine Corpn., Wellsville
RIBLET, WILLIAM H., Eastern Div. Manager, C. A. Dunham Co., New York
RIDLON, JOHN R., Superintendent, Terminal Engineering Co., New York
SCHULTZ, RUDOLPH H., Designer, Potdevin Machine Co., Brooklyn
STAUFFER, FRED, Toolmaker, Doehler Die Casting Co., Brooklyn
STOKES, SAMUEL O., Assistant Engineer, American Telephone & Telegraph Co., New York
VER PLANCK, WILLIAM E., Head of Marine Section, Turbine Engineering Dept., General Electric Co., Schenectady
WARNER, RALPH M., Gaston, Williams & Wigmore, Inc., New York
WILLIAMS, ERNEST, Mechanical Engineer, Clyde R. Place, New York
WITTAL, JULIAN J., Consulting Engineer and Patent Attorney, New York
WOLFF, RICHARD A., President, Wolff & Munier, Inc., New York

Ohio

ALLEN, WILLIAM R., Chief Engineer, The American Multigraph Co., Cleveland
BLAINE, WALTER E., Industrial Engineer, The Cleveland Tractor Co., Cleveland
DEVOE, BENJAMIN H., Production Engineer, National Carbon Co., Inc., Fremont
FISHER, JOHN A., Professor of Industrial Management, Ohio State University, Columbus
HAWKE, MELVILLE R., Power Engineer, Firestone Tire & Rubber Co., Akron
HOLLIDAY, FLETCHER L., Salesman, Worthington Pump & Machinery Corpn., Cincinnati
JOSEPH, HARVERY W., Assistant Engineer, The G. A. Gray Co., Cincinnati
JUSTICE, ITHAMAR M., Vice-President, The Manufacturers Equipment Co., Dayton
KIHN, WILLIAM J., Assistant Superintendent, Modern Foundry Co., Cincinnati
MOOHL, JOHN G. J., Chief Engineer, The Cleveland Machine Tool Co., Cleveland
SOUDER, CLEMENT F., JR., Production and Efficiency Engineer, Franklyn Engineering Service Corpn., Toledo
VICKERY, ZELDON B., Chief Draftsman & Designer, National Carbon Co., Inc., Fremont
WHITMORE, JAMES D., Mechanical Engineer, Sun Co., Toledo

Oklahoma

ROCKMAN, WILLIAM H., JR., Mechanical Engineer, Empire Refineries, Inc., Tulsa

Pennsylvania

ARMSTRONG, EDWIN J., Assistant Engineer of Plant, Wm. Cramp & Sons S. & B. Co., Philadelphia
BEALE, LEONARD T., Secretary, John T. Lewis & Bros. Co., Philadelphia
BJORNSON, EDWIN, Draftsman, Heyl & Patterson, Pittsburgh
BORTON, GEORGE W., President & General Manager, Pennsylvania Crusher Co., Philadelphia
BOWMAN, JOHN B., Mechanicsburg
CAPPOCK, WALTER J., Draftsman, Baldwin Locomotive Works, Philadelphia
CROSBY, EDWARD L., Special Assistant to General Manager, Edgewater Steel Co., Oakmont
DICKSON, GEORGE L., Lieut. Comdr., U. S. N., Assistant Insp. Eng. Material, Philadelphia
HERRESHOFF, A. GRISWOLD, Chief Engineer, Bethlehem Motors Corpn., Allentown
KIRKPATRICK, CRAWFORD N., Sales Manager, Landis Machine Co., Waynesboro
LACHMAN, IAN W., Sales Engineer, Badenhausen Co., Philadelphia
LANDIS, LAWRENCE H., Master Mechanic, Central Iron & Steel Co., Harrisburg
LEE, YUAN, American Engineering Co., Philadelphia
LONERGAN, JOHN E., Pres., J. E. Lonergan Co., Philadelphia
LONG, JOSEPH K., Chief Draftsman, Pennsylvania Railroad Co., Sunbury
McDOWELL, DAVID W., Chief Draftsman, Quaker City Rubber Co., Wissinoming
MARSHALL, DAVID L., Factory Manager, Haverford Cycle Co., Philadelphia
MATCHETT, WILLIAM LLEWELLYN, Lehigh Portland Cement Co., Allentown
MERRIFIELD, J. D., Mechanical Engineer, Reed Mfg. Co., Erie
PORTER, W. B., Assistant Engineer, Pennsylvania System, Eastern Region, Central Division, Williamsport
RYMAN, CHARLES F., Pittsburgh
STEVENS, WILLIAM H., District Sales Manager, The Aldrich Pump Co., Allentown
WORLEY, FLOYD E., Technical Superintendent, Lycoming Rubber Co., Williamsport
YOUNG, CHARLES H., Assistant to Chief Ordnance Inspector, Bethlehem Steel Co., Bethlehem

Tennessee

BUSH, GEORGE C., Mechanical Superintendent, Aluminum Co. of America, Alcoa

Texas

BEAMAN, DANIEL F., Supervising Engineer Sales Dept., The Texas Co., Houston
HOLSWORTH, ROBERT C., Engineer, Continental Supply Co., Wichita Falls
LISTER, FRANCIS G., Mechanical Engineer, El Paso & Southwestern R. R., El Paso

Utah

MOSSMAN, JOSEPH B., Branch Manager, Ingersoll-Rand Co., Salt Lake City

Virginia

NIEDERHAUSER, FREDERICK C., Assistant Superintendent, Viscose Co., Roanoke

Washington

WALSTAD, ADOLPH N., Proprietor, Walstad Machine Co., Tacoma

West Virginia

McGOUGH, FRANK, Steam Engineer, Weirton Steel Co., Weirton

Wisconsin

LINCOLN, CHARLES S., Chief Draftsman, Allis-Chalmers Mfg. Co., Milwaukee

Canada

DIXON, LEON S., Principal Assistant Engineer, Riordon Co., Ltd., Mattawa, Ontario
THOMPSON, GEORGE N. V., Engineer, Canadian National Railways, Winnipeg, Manitoba

Cuba

LESLIE, W. T., General Electrical Inspector, Havana Central Railroad Co., Havana

England

BONSTOW, THOMAS L., Chief Engineer, Whitehall Petroleum Corpn., Ltd., London

Italy

CULLETON, LEO G., Assistant Managing Director, Mario Tansini, Milan

South America

HARDING, PHILIP O., Chief Draftsman, Braden Copper Co., Rancagua, Chile
HOFFMAN, RALPH N., Master Mechanic, Andes Copper Mining Co., Antofagasta, Chile
ROBERTS, CLAY, Construction Engineer, Andes Copper Mining Co., Antofagasta, Chile

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE-MEMBER

Michigan

DOEN, LORAN F., Chief Draftsman, Champion Ignition Co., Flint

Nebraska

YINGLING, JOHN C., Assistant Chief Engineer, Fort Omaha Balloon School, Fort Omaha

New York

BANGS, GEORGE H., Production Manager, Lidgerwood Mfg. Co., Brooklyn
PAVITT, WILLIAM H., Chief Engineer, Wilputte Coke Oven Corpn., New York
SINGER, SIDNEY C., Superintendent of Distribution, Syracuse Lighting Co., Syracuse

Pennsylvania

LUETSCHER, OLIVER P., General Manager, Geo. J. Hagan Co., Pittsburgh

PROMOTION FROM JUNIOR

Connecticut

FURBUSH, GRANT E., Chief Draftsman, Fafnir Bearing Co., New Britain
HARRIS, MURRAY W., Industrial Engineer, H. G. Thompson & Son Co., New Haven
JOY, JOSEPH, Mechanical Engineer, Frasse Steel Works, Inc., Hartford

Georgia

MURRAY, ETHAN FRANK, Mechanical Engineer, Lummis Cotton Gin Co., Columbus

Illinois

PAINTER, WALTER, Technical Advertising, Erwin, Wasey & Co., Chicago

Maryland

MILLER, HARRY W., General Engineer, Balto. Copper Smelting & Rolling Co., Baltimore

Michigan

VINE, HOWARD L., Tool Design Checker, Packard Motor Car Co., Detroit

New York

CROCKETT, CHARLES H., Research Engineer Troy
NORRIS, JAMES U., Superintendent, Woman's Hospital in the State of New York, New York
SIMPSON, COLIN C., JR., General Supt. of Mains & Services, Consolidated Gas Co. of New York, New York

Pennsylvania

GOLDSMITH, LESTER M., Engineer of Tests, Atlantic Refining Co., Philadelphia

Canada

LEONARD, IBBOTSON, Vice-President and General Manager, E. Leonard & Sons, Ltd., London, Ontario

SUMMARY

New Applications	164
Applications for Change of Grading	
Promotion from Associate-Member	6
Promotion from Junior	12
Total	182

In Two Sections—Section Two

MECHANICAL ENGINEERING

The Monthly Journal Published by The American Society of Mechanical Engineers
at Easton, Pa. General Offices at 29 West Thirty-ninth Street, New York

Volume 42 November 1920 Number 11

A.S.M.E. to Celebrate its Fortieth Anniversary on November 5

Special Meeting to be Held in New York—Forty Simultaneous Meetings in Forty Cities—Interesting History of First Meeting in 1880

JUST as it is fitting for us to take stock at stated periods during the business year, so it is well for an organization to pause in its strenuous activities of development and to reflect upon the progress made and to celebrate its achievements. So on November 5, 1920, it is proposed by a series of simultaneous meetings throughout the country and a special meeting in New York to celebrate the Fortieth Anniversary of the first meeting of the A.S.M.E. which was held on November 4–5, 1880, in the theater of the Union League Club, then in Madison Square at the corner of East 26th Street, New York City.

Simultaneous Section Meetings

The thirty-eight sections are planning more or less uniform programs which, however, will be sufficiently flexible to permit any special features which may be desired. Certain of the Sections will have very comprehensive programs, including technical papers, an excursion and a banquet. The designation of a Council member, or a former officer of the Society, to attend each meeting will knit the various groups together in a unity of thought and purpose which cannot fail to stimulate in the heart of every member of the A.S.M.E. an appreciation both of the power and influence of the Society in the great engineering movements of the day.

A Special Meeting in New York

The interest in this Fortieth Anniversary has been so general that a petition has been signed by a number of members and approved by President Miller for a special commemoration meeting of the Society as a whole, to be held in New York on November 5, that the occasion may be properly celebrated at Society headquarters. This will be the first special meeting to have been held since the one in San Francisco in 1915 at the time of the Panama-Pacific Exposition. It is expected to develop this meeting in a unique way so as to fit in with the simultaneous Section meetings in other parts of the country on the same evening. An effort is being made to provide a spectacular demonstration through the use of the loud-speaking telephone, or radiophone, whereby the speeches in New York may be heard simultaneously by a number of the Sections' audiences. So far, arrangements have been completed to tie in by this means the meetings in New England and Eastern New York; but because of the commercial requirements for such service it is doubtful if the demonstration can be made at a greater distance. Even under these restricted limits, however, this feature will represent the highest attainment in radiophone service which has been achieved to date.

Special Advisory Committee Appointed

A special Advisory Committee has been appointed by the President to take charge of the arrangements of these meetings, which are under the joint jurisdiction of the Committee on Meetings and Program and Committee on Local Sections. The personnel of this Committee is Henry R. Towne, senior living Past-President, Major William H. Wiley, who was present at the Organization Meeting and Preliminary Meeting—the first meeting which we are to celebrate—and who, by a strange coincidence, will on November 5 celebrate the 36th anniversary of his first election as Treasurer, W. Herman Greul, Frank T. Chapman, Harry A. Hoff and L. B. McMillan.

Special Meeting of the Society

A special meeting to celebrate our Fortieth Birthday will be held at Society Headquarters November 5, 1920. The call for this meeting is printed below and in accordance with the Constitution of the Society has been signed by the required number of members and approved by the President.

New York, October 1, 1920.

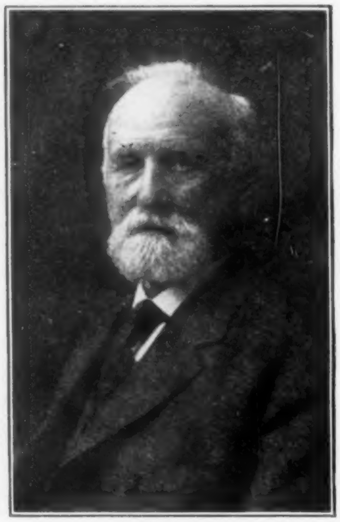
Mr. Fred J. Miller, *President*
The American Society of Mechanical Engineers.
Dear Sir:

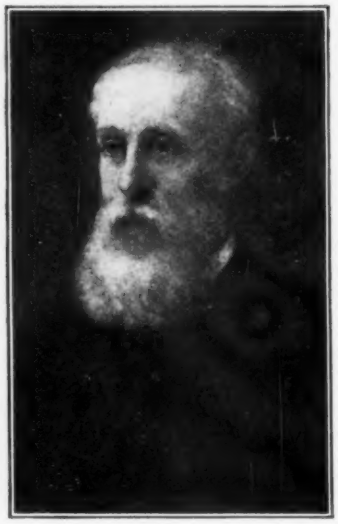
We, the undersigned voting members of the Society, do hereby request in accordance with Article 41 of the Constitution that you call a special meeting of the Society to be held in New York at 8.00 p.m., Friday, November 5, 1920, for the purpose of celebrating the 40th Anniversary of the first meeting of The American Society of Mechanical Engineers.

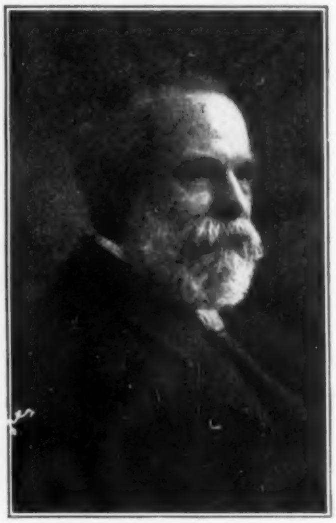
Respectfully,

S. N. Castle	C. Harold Berry	D. G. Baker
Wm. E. Bullock	C. B. LePage	C. V. Kerr
L. P. Alford	J. A. Seymour	H. V. R. Scheel
L. G. French	G. K. Parsons	W. W. Macon
C. M. Sames	W. S. Finlay, Jr.	F. J. Winters, Jr.
J. E. Vera	O. W. Harvey	W. H. Taylor
Ernest Hartford	E. A. Stillman	Claude Hartford
O. F. Allen	W. E. Symons	W. J. Glendenning
E. L. Sherwood	C. A. Adams	W. H. Kavanaugh
C. W. Obert	J. H. Deppeler	R. H. Fernald
Chas. W. Burrows	A. S. Kinsey	F. T. Chapman
W. Herman Greul	Calvin W. Rice	W. H. Boehm
B. V. Swenson	W. M. McFarland	A. D. Blake
A. M. Mattice	G. A. Trube	S. D. Collett
Francis H. Richards	P. M. Lincoln	J. H. Lawrence
W. W. Ricker	Geo. A. Orrok	H. C. Meyer, Jr.
R. J. S. Pigott	W. C. Brinton	J. W. Nelson
G. J. Foran		

Approved,
Fred J. Miller, *President.*







John E. Sweet — Alexander L. Holley — Henry R. Worthington — Robert H. Thurston

FOUR OF THE DISTINGUISHED FOUNDERS OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

A Brief Account of the Beginning of The A.S.M.E. and Some Notes on Its First Annual Meeting, November 4 and 5, 1880

"THE concept of an American Society of Mechanical Engineers took shape in the winter of 1879–1880." In these words Dr. Frederic Remsen Hutton begins his history of the A.S.M.E. In that year, he tells us, the American Society of Civil Engineers and the American Institute of Mining Engineers were both in existence, and yet, strange to say, the "engineers of production and of the factory and power plant" had no means of meeting together for an exchange of views on the problems of their particular field. Furthermore the feeling that a society of mechanical engineers should be formed was shared by many, for the Centennial Exposition of 1876 had aroused a national interest in matters of a mechanical nature and the period itself, coming just after the Civil War, was witnessing great industrial development and growth.

And so it was but natural that Prof. John E. Sweet, who had just resigned as head of the shop department of Cornell University to begin the manufacture of engines of his own design, and Mr. Jackson Bailey, then editor of *American Machinist*, should begin a correspondence "looking to the formation of a national society to be devoted to the advancement of mechanical engineering."

The Preliminary Meeting of February 16, 1880

Mr. Bailey early suggested that Professor Sweet prepare a list of persons to whom an invitation should be sent asking them to take part in a meeting at which plans for the creation of such a society might be discussed. Professor Sweet, however, hesitated to call such a meeting upon his own initiative and so he first consulted Mr. Alexander L. Holley and Prof. Robert H. Thurston in regard to the plan. They at once approved and thereupon Professor Sweet issued the call as originally suggested. The date set was February 16, 1880, and on that day a total of 30 persons gathered in the office of the *American Machinist*, then located at 96 Fulton Street, New York City. Professor Sweet called this all-important gathering to order and Mr. Holley was nominated chairman. What followed is perhaps best told by Dr. Hutton in his history of the Society, in which we read:

> Mr. Holley made an opening address on The Field of Mechanical Engineering, covering his conception of it and the type of man from which such a society, if organized, might draw its membership. The engineer of fixed works, usually called the civil engineer, he said, has his structures built for him by mechanical means. The military engineer has his fort or gun carriage made by machines. In bridge building the shop is the economic factor, in mining the work of mining ore is done by the machine drill, the steam hoist, the power transportation system. In metallurgy and the rolling mill, in the foundry and the forge, there are thousands of special machines and tools at once presented to the mind. In railways and in transportation by water the structures and the working are all in the field of mechanics and dynamics, and the railway master mechanics are one of the largest defined classes of mechanical engineers.
>
> In agriculture, architecture, and in the industries in general, the textile mill, the paper mill and the factory of all kinds, the motive power and most of the equipment are the creative and the operative burden of the mechanical engineer. Hence, the Society proposed should find no lack of membership material.
>
> Mr. Holley also reviewed the advantages and character of such an organization as proposed, dividing them as follows:
>
> (*a*) The collection and diffusion of knowledge.
>
> (*b*) The advantages from personal acquaintance among the members.
>
> (*c*) The educational value of the habit of writing papers and of debate upon them.
>
> (*d*) The significance of the endorsement of a high quality of elected membership.
>
> Finally he referred to the tendency of mechanical engineering in America to combine the professional scientifically trained mind with the qualities of leadership in the processes of production, so that the engineer is often also a business man. Hence, the necessity was plainly present to his mind, that membership should be sought for two classes; for the professional man engaged in an office practice, either by himself or in the employ of an industrial corporation; and for the executive type of man whose compensation was for his talents and success on the business side of industry. The Junior membership for the young man in the shop and for the young graduate of engineering schools was obviously necessary. He urged the policy of a membership vote on candidates, the significance of representative engineers for office in the new organization, and the advisability of frequent meetings. The value of the first papers as setting a standard of excellence for the future and securing interest for the Society and its work was his closing word.
>
> There were no published minutes of this preliminary meeting, but from manuscripts and other sources there is a record of a discussion as to the name to be given to the new body. Professor Trowbridge, familiar with the practice at that time in Yale University, urged the term "dynamical" in lieu of "mechanical" as the qualifying adjective for the proposed type of engineer, on the ground that the higher field of such persons was the generation and control of power. The inevitable confusion with the name dynamo as a machine for converting mechanical energy into electrical was argued against this suggestion, and finally, at the suggestion of Mr. Chas. W. Copeland, the meeting accepted the name, American Society of Mechanical Engineers, following the example set by the American Society of Civil Engineers, already well and favorably known.
>
> This meeting thus practically decided that there *was to be* such a society; it only remained to formulate the details.
>
> The first step was to appoint a committee to draw up the basis of organization and formulate its rules; this was done by making Messrs. Henry R. Worthington, Eckley B. Coxe, Jackson Bailey, Genl. Quincy A. Gillmore, Prof. W. P. Trowbridge, M. N. Forney, and A. L. Holley such a committee. A committee to nominate officers under such organization was appointed also, consisting of Messrs. A. L. Holley, John L. Sweet, E. D. Leavitt, C. T. Porter and H. R. Worthington. An adjournment was then taken to April 7 to hear the reports of these committees, to act thereon and to effect a permanent organization thereunder.

The A.S.M.E. Is Organized April 7, 1880

In accordance with the events as chronicled above, the first meeting of the Society, or rather its organization meeting, was therefore held on April 7, 1880. Dr. Henry Morton, then president of Stevens Institute of Technology, at Hoboken, N. J., had coöperated with Mr. Holley in some of the preliminary mat . of organization, and upon his invitation this first meeting of the Society was called to order in the large assembly hall of the Institute. Mr. Holley as chairman of the preliminary meeting had issued the call but he was kept away by illness and in his stead Mr. Worthington took the chair. The roll call showed 80 present. What occurred at this initial gathering of the mechanical engineers of America has been faithfully recorded, and we again quote from Dr. Hutton's entertaining history:

In his opening address, Mr. Worthington reported two decisions reached in the conference which had preceded the meeting. The first was that a policy of broad interpretation of the troublesome problem of eligibility to membership had been settled by ruling against a specific wording of qualifications, leaving the Council free when acting as a membership committee to settle each case by itself. The Society did not create a Membership Committee for many years (1904), but the Council had one for its own convenience long before the Constitution recognized it and fixed its method of procedure.

The other policy was that of recognizing that the governing Council of the Society should be the persons who would know best whether the Secretary of the Society when he was found, was a person whose methods were building up the Society or blocking its progress.... It was best, therefore, to take the office of the Secretary out of the Society politics, and make him the appointee of the elected officers who form the Council....

The Committee on By-Laws then presented its report through Mr. M. N. Forney. There seems little doubt that these rules were drafted by Mr. Holley, and sent for criticism to his colleagues, and found acceptable by them. The ideas embodied the successful features of method in use by the then existing engineering societies, with the additions and changes to meet the special group of conditions. The headings were: (*a*) objects, (*b*) membership, (*c*) procedure of election, (*d*) fees and dues, (*e*) officers of the Society, (*f*) procedure of election of officers, (*g*) meetings, (*h*) papers, (*i*) amendments.

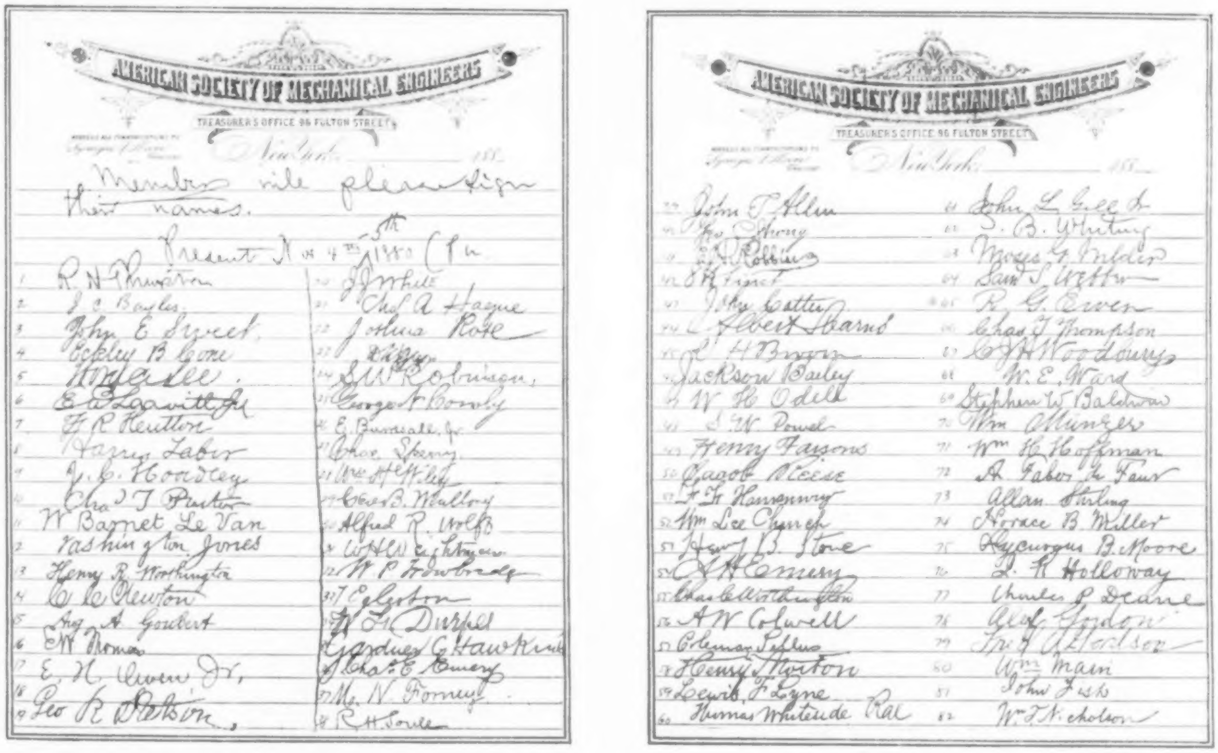
At once an interesting question arose in this gathering of eighty men. Who were qualified to vote on the adoption of the proposed report and its rules for conduct of the Society, and who could vote and elec the officers to be reported as recommended by the other committee soon to be heard from? The question was discussed back and forth, until Mr. W. F. Durfee arose. He was a distinguished student of antiquarian Americana, and stated that the method followed by pioneer pilgrims could be presented in the following syllogism:

Major Premise: The highest authority states: "The earth is the Lord's and is the inheritance of the Saints."
Minor Premise: We are the Saints!
Conclusion: There could be no question to whom the earth belonged.

Amid much laughter the meeting decided by a rising vote that all who were then present and those who had attended or sent letters to the preliminar meeting and who subsequently qualified by paying the required initiation fee of $15, were proposed by the Committee on Organization as charter members and were entitled to vote. The Rules were thereupon adopted, and made the organic law of the new Society.

The First Officers of the Society

The Committee to nominate officers for the first year then presented the following ticket, and there being no objection raised, the meeting adjourned, referring to the officers the details of arranging for the first Annual Meeting in the fall.



Register of the First Annual Meeting of The American Society of Mechanical Engineers, Held at the "Turf Club" (Now the "University Club"), New York City, November 4 and 5, 1880

PRESIDENT

Robert H. Thurston
Stevens Institute of Technology, Hoboken, N. J.

VICE-PRESIDENTS

Henry R. Worthington .... New York
Coleman Sellers .... Philadelphia, Pa.
Eckley B. Coxe .... Drifton, Pa.
Quincy A. Gillmore .... U. S. Army
Wm. H. Shock .... U. S. Navy
Alexander L. Holley .... New York

MANAGERS

Wm. P. Trowbridge .... New York
Theo. N. Ely .... Altoona, Pa.
John C. Hoadley .... Lawrence, Mass.
Washington Jones .... Philadelphia, Pa.
Wm. B. Cogswell .... Syracuse, N. Y.
Francis A. Pratt .... Hartford, Conn.
Charles B. Richards .... Hartford, Conn.
S. B. Whiting .... Pottsville, Pa.

TREASURER

Lycurgus B. Moore .... New York

The First Annual Meeting, November 4 and 5, 1880

The new Society was at once successful and during the interval between the organization meeting of April 7 and November 4 more than doubled its membership, for the first Transactions record the fact that when this first Annual Meeting was held in what was then the theater of the Union League Club at the corner of Madison Avenue and 26th Street, New York City, the Society consisted of 163 Members, 17 Associates, and 9 Juniors, a total of 189. Of these 84 were present at the first Annual Meeting and 15 of them participated in the presentation of engineering papers.

It is interesting to note the subjects chosen by the authors of these papers as they indicate to some extent the field of mechanical engineering at that time. As given in Volume 1 of the Transactions, the titles of the papers and their authors were as follows:

The Metric System .... Coleman Sellers
Regenerating Metallurgic Furnaces .... Jacob Reese
Putting a New Crank-Pin in the Engine of the S. S. Knickerbocker .... Lewis Johnson
Measurement of the Friction of Lubricating Oils .... C. J. H. Woodbury
Strength in Machine Tools .... Charles T. Porter
Standard Sizes of Screw Threads .... G. R. Stetson
An Adaptation of the Bessemer Plant to the Basic Process .... Alexander L. Holley
Friction as a Factor in Motive Power Expenses .... John E. Sweet
High Ratios of Expansion and Distribution of Unequal Pressures in Single and Compound Engines .... J. C. Hoadley
The Value of the Study of the Mechanical Theory of Heat .... A. R. Wolff
Efficiency of the Crank .... S. W. Robinson
Mechanical Correctness .... Charles A. Hague
Packing for Piston Rods and Valve Stems .... L. F. Lyne
Cushion Adjustment in Engines .... S. W. Robinson
On Practical Methods for Greater Economy of Fuel in the Steam Engine .... Allan Stirling

President Thurston called this first meeting to order at 2 p.m. on November 4, 1880. His inaugural address dealt with the objects of the new Society, and the methods which must be followed if it was to accomplish its task, and occupy its proper place in the rapidly expanding science and practice of engineering. It is significant that Professor Thurston especially urged and outlined as the larger word of the Society participation in the field of social economy rather than advancement of the individual interests of its members.

There was but little business to come before this initial gathering of American mechanical engineers. It was first agreed that Mr. Lycurgus B. Moore, Treasurer of the Society, should also act as Secretary until such time as the Council might make a permanent appointment, and resolutions were next offered and passed to the effect "that the Council be authorized to open the ballots for members proposed at the first meeting, and to declare the elections of such as are passed according to the rules of the Society."

Reports were then submitted by Mr. Moore as acting Secretary and Treasurer and both were duly approved. Mr. Holley next offered a resolution authorizing the President to appoint standing committees (five members each, two to be members of the Council) on Rooms and Conversazione; and Arrangements for Regular Meetings. This resolution was promptly passed and President Thurston announced that appointments would be made before the meeting adjourned. The Secretary then read the order in which the papers would be presented.

Frank B. Gilbreth, Now LL.D.

Members of The American Society of Mechanical Engineers will be glad to know that at the last commencement at the University of Maine, Frank B. Gilbreth was granted the degree of LL.D. for his work on waste elimination, motion study and management, and researches in the subject of fatigue, particularly the elimination of unnecessary fatigue through motion study, which is now recognized throughout the world. In conferring the degree, President Aley laid great stress on Dr. Gilbreth's inventions in civil engineering, as well as in scientific management, also on the fact that Dr. Gilbreth applied motion study to the reëducation of the handicapped. Dr. Gilbreth is an Honorary Member of the Society for the Promotion of Occupational Therapy, of which society Dr. Jules Amar was made an Honorary Member at the same time.

The Secretary's Letter

The professional engineer has an unrivaled opportunity to serve the world at this crisis.

It is by the invention and application of labor-saving devices that we increase production. At the same time, by the introduction of new devices and by better administration the engineer can make labor more efficient. It has been claimed that the introduction of automatic machinery and the specialization of the worker dull the interest—that whereas formerly the mechanician constructed the entire article, today he is confined to the repetition of a single piece and cannot picture in his imagination the completed article, therefore, becoming merely a machine, or a part of a machine and supplying only the eyes or hands to a mechanism which inventive genius has not yet been able to add.

I believe this difficulty, which of course is a difficulty if allowed to remain uncorrected, will be a serious handicap to the introduction of specialized apparatus. The proper way to meet it, however, is by the introduction of charts showing the rate of progress on a particular machine or collection of machines, or process, so that the operator may compare, from hour to hour or from day to day, the results of his work. This will instil in him the desire to maintain his record of achievement. Along with such charts for the various individual processes should be shown the effect of poor workmanship at each step on the final product, in order to establish in each individual a sense of obligation to his fellow-workers.

First, we should now put emphasis on the increased production of necessities;

Second, on the development of transportation, and

Third, as an accompanying activity, increased sources of power.

In Washington the Water Power League of America has just met to discuss the best means of coöperation between the State and Federal Governments and has planned for the national and coördinate development of all unused water resources of the United States. Prof. George F. Swain, member of this Society and president of the Water Power League, was in the chair.

Our Professional Section on Transportation has planned a remarkable session at the Annual Meeting and the keynote session of that meeting will be a series of addresses by the leaders of the United States in transportation. The failure adequately to maintain the railroads during the war period has developed to an extraordinary degree the motor truck, and our sister society, the Society of Automotive Engineers, is commendably active in giving attention to this phase of transportation.

As to the matter of Fuels—our Professional Section on that subject is also to hold an important session at the Annual Meeting.

With these three important phases of the solution of the world's difficulties, it would seem as if every member of the Society might be included and all have a part to a satisfying degree.

Calvin W. Rice,
Secretary.

Membership Elects New National Officers

Under the provisions of the new By-Laws, the Secretary announced on October 1 the result of the letter ballot of the Society or the national officers for the year 1921, as follows:

For President:
Edwin S. Carman
For Vice-Presidents:
Leon P. Alford
John L. Harrington
Robert B. Wolf
For Managers:
Louis C. Nordmeyer
Henry M. Norris
Carl C. Thomas
For Treasurer:
William H. Wiley

The following telegram was sent to the successful candidates by Mr. Rice:

> Pleased to announce your unanimous election for 1921. Accept our good wishes, also our personal congratulations. Society has wonderful opportunity for good at this time of readjustment of the world, and you in turn have both the responsibility as well as the opportunity to lead in the consummation of the highest ambition of the engineering profession. Calvin W. Rice

The inauguration of the new officers will take place on the open-

ing night of the Annual Meeting, December 7, and their terms of office will begin on the adjournment of the Annual Meeting in December, in accordance with the usual custom. The plan of announcing the election two months in advance, carried into effect this year for the first time, was adopted so that the new officers might familiarize themselves with the extensive activities of the Society well in advance of their assuming responsibility for its government. Biographical sketches of the officers were sent to the membership, accompanying the blanks for the letter ballot.

Tenth Anniversary of Condensed Catalogues

Is it not gratifying, when a pause in the daily routine permits, to review the efforts of years and to find in each successive year larger growth and greater development? The Society's publication Condensed Catalogues of Mechanical Equipment shows just such a pleasing growth and development, demonstrating its usefulness and value in its field of service. The tenth annual (1920) volume, now being distributed to the membership, is more comprehensive than ever, embodying features that facilitate its use and enhance its value as a reference book.

There are 745 catalogue pages containing the condensed catalogue data of 572 firms. These data are all presented in a uniform manner and includes descriptions of over 1500 pieces of apparatus, instruments, materials and the like—illustrated by over 2000 engravings. The indexing and classifying is thoroughly done so that the particular data sought can be instantly found.

The Mechanical Equipment Directory pages contain the names and addresses of over 4000 firms under 3000 classifications of equipment. The names and addresses of over 800 consulting engineers under 500 classifications are to be found in the Consulting Engineers' Directory.

The volume may be purchased by non-members at $4.00 a copy. Extra copies for members at $3.00 each.

President-Elect E. S. Carman Carries Greetings to the Canadian Engineers

The cordial relations existing between the Engineering Institute of Canada and the various engineering societies of the United States was again emphasized at a meeting of the Institute held at Niagara Falls, in September, by the attendance of Mr. E. S. Carman, President-Elect of The American Society of Mechanical Engineers, who conveyed to the members of the Institute the congratulations of engineers on this side of the border upon the successful conduct of the meeting and the important engineering developments which were to be discussed. He said that he represented practically thirteen thousand mechanical engineers of the United States, who are at all times prepared to greet the Canadian engineers as brothers.

This meeting was devoted mainly to papers relating to power development at Niagara Falls and to transportation on The St. Lawrence River and through the Welland Ship Canal. The papers presented were the following: The St. Lawrence Route and the Welland Ship Canal, by Alexander J. Grant; Design of The Queenston-Chippawa Power Canal, by T. H. Hogg; Hydraulic Installation of The Queenston-Chippawa Power Development, by M. V. Sauer; Electrical Features of The Queenston-Chippawa Power Development, by E. T. J. Brandon; General and Economic Features of The Queenston-Chippawa Power Development, by H. G. Acres; Demonstration of The Gibson Method of Measuring The Flow of Water in Closed Conduits for Determining The Efficiency of Hydraulic Turbines, by N. R. Gibson.

An interesting comment was made by one of the speakers, T. H. Hogg, assistant hydraulic engineer of the Hydro-Electric Power Commission of Ontario, who expressed his personal opinion that at some time in the future all of the water diverted from Niagara Falls for hydroelectric purposes would be used at Queenston and Lewiston, and that the Ontario Power Company's power plant located in the gorge would in that event have to be practically abandoned.

Aeronautic Section Now Under Way

At the call of Howard E. Coffin, member of the Special Committee on Professional Sections representing Aeronautics, members of the Society met at the Detroit Athletic Club on September 27 and voted to petition the Council for the formation of a Professional Section on Aeronautics.

The meeting was a small one due to inclement weather and also probably due to the wide distribution of the 201 members who have registered for the Section. A few of those present were from the Detroit Local Section, to all of whose members an invitation had been sent.

In opening the meeting, Mr. Coffin gave an intimate picture of the development of aircraft in this country during the war; of the status of the work of the various organizations at present interested in aeronautics and of the relations between the aircraft manufacturers and these organizations and the Government and foreign countries. He gave his opinion of the place an Aeronautic Section of our Society would have in the field and considered that such a section would be able to contribute to a good general result in respect to legislation.

The Society of Automotive Engineers, which has done more in the field of aeronautic technology in this country than any other organization, was represented by its general manager, Coker F. Clarkson, who promised the support of his organization to our Section. Mr. Clarkson called attention to the large number of men interested in this subject who were members of the two organizations, and he hoped that the A.S.M.E., in appointing committees, would give careful consideration to avoiding duplication of effort and to overloading men on whom the S.A.E. was already calling heavily. He was assured that this would be watched and that certainly our Society would not take on any work which the S.A.E. is doing. Our program would be devoted more to periodical reviews of the aircraft situation issued for the benefit of our whole membership and to providing an organization which would be available for service to the industry if required.

Following the vote on the petition an Organizing Committee, consisting of Burt D. Thompson, Victor R. Heftler and E. E. Aldrin, was appointed to prepare a letter ballot for the election of an Executive Committee of five to conduct the work of the Section.

Any members of the Society interested in this Section, but not yet registered, are invited to send in their names to the Secretary. There are no extra dues for any of these Professional Section activities. Non-members may also be registered as affiliates.

Materials Handling Section Elects Officers

The Organizing Committee of the Materials Handling Section, F. E. Lister, N. J. Penning and H. E. Whitaker, has taken a letter ballot of the members registered in this Section, with the result that the following have been elected as the Executive Committee of the Section: Robert M. Gates, Chairman; Harold V. Coes, Vice-Chairman; F. A. Wardenberg, Nathan C. Johnson, and Kern Dodge.

Mr. Gates is engineer of the Lakewood Engineering Company and has just been transferred to the Philadelphia office of the company in the Widener Building. His professional work has been chiefly in connection with the design and manufacture of special cranes.

Mr. Coes has had a varied experience, including the manufacture of carbonic acid gas and acetylene gas; his specialty is now industrial engineering and ideal plant development, plant locations and rehabilitation of existing plants.

Mr. Wardenberg is directing engineer of the du Pont Powder Company, all power, water-supply and fire-protection matters being under his supervision.

Mr. Johnson, now a consulting concrete engineer, was formerly engineer with the Raymond Concrete Pile Company. His early work included research in the magnetic properties of iron and steel.

Mr. Dodge is well known in Philadelphia and was formerly associated with Mr. Charles Day. He was trained at the Link-Belt Company and has been for some years a consulting engineer on industrial power plants.

The greatest economic need of civilization today is the devising

of means and a more intelligent application of proper and coordinated methods whereby materials of one kind or another may be handled more swiftly and to better advantage.

Probably at no time in the world's history has there been so dire a need for the efficient interchange of products. Old isolations and boundaries have dissolved. Over half of the productive world has been engaged in destruction and there is now correspondingly imperative necessity for reconstruction both physically and morally.

Under this ever-increasing load, old systems of commodity interchange have broken down. Industrial and railroad congestion is almost intolerable and with these continued conditions have come mounting costs, until better, more efficient and more adequate systems must come into being if the cost differential that is now being reflected in the soaring prices of all goods is to be modified.

The burden of this necessity therefore makes it imperative that a professional section composed of those whose interests and whose expert knowledge bring this problem close to them, shall assume this work as its obligation to the technical fraternity and its contribution toward the solution of our national economic problem.

To accomplish this in the most beneficial way, the Section must be the common channel of intercourse between all technical and industrial organizations on the subject of mechanical handling of all materials. It must be the bureau of information—complete in its scope, specific in its knowledge of the physical and economic conditions and unbiased in its conclusions. This must be done by having special meetings on particular subjects, meetings jointly with other sections, other organizations or associations, by taking part in all local and national problems relating to the purpose of this Section.

First Professional Section Papers Presented by Railroad Section

Among the new Professional Sections, the honor of presenting the first papers rests with the Railroad Section. This section had charge of the program at a joint meeting, on Friday evening, October 22, of the New York Section of the A.I.E.E. and the Metropolitan Section of the A.S.M.E. It was Railroad Electrification Night, and the remarks and the discussion were directed toward a determination of the relative advantages of modern steam and electric locomotives. Following is an outline of the program:

Introductory Remarks:
Frank J. Sprague, Consulting Engineer.
Steam-Locomotive Advantages:
John E. Muhlfeld, Railway & Industrial Engineers, Inc.
Electric-Locomotive Advanatges:
A. H. Armstrong, Chairman Electrification Committee, G. E. Co.
F. H. Shepard, Director of Heavy Traction, Westinghouse Elec. & Mfg. Co.
Discussion—Steam Point of View:
W. L. Bean, Asst. Genl. Mech. Supt., N. Y. N. H. & H. R. R.
A. W. Gibbs, Chief Mechanical Engineer, Pennsylvania System.
F. H. Hardin, Chief Engr. of Motive Power, N. Y. C. R. R.
Wm. F. Kiesel, Jr., Mechanical Engineer, Pennsylvania R. R.
Discussion—Electric Point of View:
C. H. Quinn, Chief Electrical Engineer, Norfolk & Western Ry. Co.
A. L. Ralston, Mechanical Superintendent, N. Y. N. H. & H. R. R.
E. B. Katte, Chief Engr. Elec. Traction, N. Y. C. R. R.
Closure of Discussion:
George Gibbs Consulting Engineer, Pennsylvania R. R.

DOINGS OF LOCAL SOCIETIES

Detroit Engineering Society

Over 200 members of the Detroit Engineering Society attended the meeting on Friday evening, September 17, to hear Mr. Charles Evan Fowler, consulting engineer of New York and Detroit, lecture on Harbors and Harbor Bridges. Mr. Fowler not only discussed harbor facilities in general but made particular references to the proposed Detroit-Windsor Bridge. Beautiful lantern slides showing harbors all over the world, giving general views, plans and considerable details together with views of long-span bridges over harbors were interspersed with a considerable amount of engineering information in detail. Mr. Fowler had samples of the actual cables of the Manhattan and Brooklyn bridges placed in the lobby prior to the lecture, in which great interest was manifested. The Great Lakes-St. Lawrence Tidewater Congress held recently in Detroit, at which Mr. Fowler was one of the leading speakers, has made the subject of harbor improvements one of daily conversation in that city. The automobile industry put Detroit into the fourth place in population among cities in the United States, and there is no predicting where she will land if the new tidewater project becomes a reality.

Mr. Fowler is a member of the American Society of Civil Engineers and the Engineering Institute of Canada. His experience extending over thirty years has embraced the design and construction of bridges and harbors all over the North American Continent and he has also been associated in a number of large foreign harbor and bridge projects.

Providence Engineering Society

We have heard much about the scrapping of the League of Nations but none of us, not even the radicals—Lenin and Trotsky—has suggested the scrapping of Sir Isaac Newton's theory of the laws of gravitation. This has been left to one Einstein, who claims that our former conceptions of gravitation are erroneous. Prof. C. L. E. Moore, of the Massachusetts Institute of Technology, presented Einstein's theory to the Providence Society at a meeting on September 28, giving the members present an opportunity to hear the European physicist's novel proposition, check upon their old ideas, and, if necessary, bring their knowledge up to date.

Coming Section Meetings

Atlanta.
November 5. Celebration of the 40th Anniversary.
November 23. Subject: The Manufacture of Cotton Goods, by J. T. Wilke, of Atlanta, Ga.

Chicago.
November 5. At the Morrison Hotel. Subject: The Railroad Problem, by W. A. Finley, Pres. of the Chicago & Northwestern R. R.

Connecticut.
November 5. Annual meeting.

Waterbury.
November 5. In the Chase Co.'s Office Building, Waterbury, Conn.

Mid-Continent.
November 5. In the Chamber of Commerce Rooms, Tulsa, Okla.

Philadelphia.
November 5. Smoker at the Hotel Adelphia. Subject: The Manufacture of Tobacco, by Ben Lichty, Vice-President, The Eisenlohr Co., Philadelphia, Pa.

Pittsburgh.
November 5. At the Chatham Hotel.

Metropolitan.
November 26. Joint meeting with N. Y. Section A. I. E. E. in Engineers Building. Subject: Power Generation.

On October 5, President Miller made a trip to Providence to talk on an industrial-relations subject in connection with the joint meeting of the Providence Engineering Society and the Management Section of the A.S.M.E. It was the first joint meeting of the season, and was well attended and proved to be most profitable.

Engineering Society of Akron

The Engineering Society of Akron will begin its activities of the season on October 29 with a lecture by Prof. F. O. Ellenwood, recently of Cornell University and now of the Goodyear Tire & Rubber Co. The Akron people have been very much alive and plan to set a pace on the 29th which will establish a splendid standard for the remainder of the season.

Recent Section Meetings

Baltimore:
October 5. The Industrial Uses of Gas, by Thompson King, Consolidated Gas Electric Light & Power Co.

Buffalo:
October 26. Steam Railroad Electrification, by S. T. Dodd, General Electric Co.

Cleveland:
October 5. Relation to the Industry of the National Screw Thread Commission's Report, by E. C. Peck of the Cleveland Twist Drill Co.

Colorado:
October 29. At the Metropole Hotel, Denver, Col.

Columbus:
October. In the Club Rooms, Southern Hotel, Columbus, Ohio.

Connecticut:
Meriden Branch:
October 12. Visited the plant of the Connecticut Telephone and Electric Co. Demonstration of Gasoline Motor Testing on the Dynamometer, by J. H. Bartholomew. Also an Oscillographic Demonstration of Ignition Coil Operation, by J. A. Terrell. Address on the Generation of Electrical Oscillations by Thermionic Tubes, by H. P. Donle, Chief Engineer.
Waterbury:
October 2. At Stevenson, Conn. Inspection was made of the new hydroelectric plant of the Connecticut Light & Power Co.

Houston:
October 14, 15, 16. Joint meeting with the Mid-Continent Section at Dallas, Texas.

Metropolitan:
October 22. Subject: Relative Advantages of Modern Steam and Electric Locomotives. For details see page 154.

Minnesota:
October 4. Water Treatment for Industrial and Municipal Purposes, by L. I. Birdsall, Supt. Minneapolis Filtration Plant.

Philadelphia:
October 26. Bearings, by Albert Kingsbury, Consulting Engineer, Pittsburgh, Pa.

Providence:
October 5. Management, by President Fred J. Miller.

St. Louis:
September 24. Business meeting and discussion of Society's affairs and activities.

Washington State:
October 1. Thermal Conservation, by H. V. Carpenter of State College of Washington.

George Montefiore Foundation Contest

There have been received from L. Calmeau, Le Secrétaire général de l'Association des Ingénieurs électriciens sortis de l'Institut électrotechnique Montefiore, Liége, Belgium, the conditions of a contest to be held during 1921 for the best original work on scientific development and on the progress of technical applications of electricity in all branches, excepting popular applications. It is specified that work should not be mere compilation. This contest was instituted by George Montefiore, the founder and late honorary president of the Institute Electrotechnique Montefiore, and is held under the auspices of the George Montefiore Foundation. The prize to be given to the winner of the contest is the Foundation George Montefiore, consisting of the interest on 150,000 francs at 3 per cent for three years.

PERSONALS

Alfred B. Strickler, who was formerly with The Prest-O-Lite Co., Indianapolis, Ind., is now located with the Service Engineering Division of Thomas A. Edison, Inc., Orange, N. J.

Carroll D. Billmyer has resigned his position as assistant engineer for the Atlas Portland Cement Co., Northampton, Pa., to reenter the teaching profession. He is located at the Georgia School of Technology, Atlanta, Ga., as assistant professor of mechanical drawing in the Coöperative Course.

Frank R. Zimmerman, formerly chief engineer with the National Iron Co., Duluth, Minn., is now secretary and treasurer of the Superior Iron Works Company, of Superior, Wis.

R. T. Wood, formerly industrial engineer with The Standard Tool Company, is now connected with The Glidden Company, of Cleveland, Ohio.

C. W. Olson has resigned his position as chief tool designer with the Continental Motors Corporation and is now connected with the National Steel Products Company of Detroit, Mich., as factory manager.

R. W. Leeper, formerly with the General Electric Company in Cincinnati, Ohio, is now with The Management Engineering and Development Company, Dayton, Ohio.

F. H. Thomas, formerly treasurer of the C. & G. Cooper Company, of Mt. Vernon, Ohio, was recently elected vice-president in charge of sales. G. S. Rentschler, of Hamilton, Ohio, is a member of the Board of Directors of this company.

Grant E. Furbush has severed his connection as chief draftsman, the Fafnir Bearing Company, New Britain, Conn., to become head of the drafting department at the State Trade School, New Britain.

The Tractor Division of the Taylor-Wharton Iron & Steel Company, known as the Tioga Manufacturing Company, the owner of all Tioga tractor patents, has been sold to the Steinmetz Electric Motor Car Corporation, of Baltimore, Md., a corporation recently organized to produce electric trucks under the patents of Dr. Charles P. Steinmetz, chief consulting engineer of the General Electric Company, of Schenectady, N. Y. Tioga tractors will therefore be built hereafter at the just-completed Baltimore plant of the Steinmetz Company. A. M. Leoni, the designer of Tioga tractors, is going to Baltimore with the Steinmetz Company to be at the head of engineering and production.

H. J. Marks, formerly sales engineer and district sales manager, New York, for the Badenhausen Company, is now established in New York City as H. J. Marks & Co., Inc., sales engineers, who will act as New York agents for the Badenhausen Company.

Hudson H. Bubar has resigned from the National Aniline & Chemical Company, Inc., to accept a position as maintenance and construction engineer with the Mutual Chemical Company of America, New York.

S. F. Shaw has resigned as superintendent of the American Smelting & Refining Company, Charcas, San Luis Province, Mexico, to accept a position as manager of the Cia. Mra. La Constancia, at Sierra Mojada, Coahuila, Mexico.

Homer L. Rank, for the past sixteen years with the Mead-Morrison Manufacturing Company of Boston, New York, and Chicago, and for the past three years assistant manager of their New York office, is now associated with Richard Morton, engineering contractor, Baltimore, Md.

J. G. Schabert, formerly tool designer with the Yale & Towne Mfg. Company, Stamford, Conn., has been appointed instructor-in-charge of the Training School for Productive Employees of that company.

F. Van Buren Connell, formerly sales engineer for the Automatic Fuel Saving Company of Philadelphia, has accepted a similar position with the Whalen-Crosby Electric Company of Philadelphia.

Paul J. Keifer, formerly assistant professor of steam engineering, University of Illinois, is now associate professor of mechanical and marine engineering, Post-Graduate Dept., U. S. Naval Academy, Annapolis, Md.

Forrest E. Jones has accepted the position of instructor in the mechanical engineering laboratory of the engineering school, University of Texas, Austin, Tex.

J. H. Klinck has been discharged from the Army and has returned to the Westinghouse Electric & Manufacturing Company. He will be located in the general sales department of the East Pittsburgh Works.

M. J. Plonsker has accepted a position as assistant works engineer with the J. I. Case Plow Works Company, of Racine, Wis.

Harry A. Schwartz, formerly assistant engineer, Defiance Machine Works, Defiance, Ohio, is now manager of research, Research Laboratory, the National Malleable Castings Company, Cleveland, Ohio.

Charles H. Bromley, associate editor of *Power* for over eight years, is giving up this position to take up engineering and commercial executive duties with the Richardson-Phenix Company, Milwaukee, Wis.

The consolidation is announced of Westinghouse, Church, Kerr & Company, Inc., and Dwight P. Robinson & Company, Inc., under the name of Dwight P. Robinson and Company, Inc. Carl C. Thomas has been appointed western representative of the new organization. His office, as stated in the October number of Mechanical Engineering, is in Los Angeles, Cal.

NECROLOGY

ROBERT E. MUNRO

Robert E. Munro, chief inspector of the Baltimore Department of the Hartford Steam Boiler Inspection & Insurance Company, died on March 29, 1920, after a prolonged illness. He was born June 14, 1862, and was educated in Liverpool, England, being graduated from the Liverpool Institute in 1877. After serving his apprenticeship with Rollinson's Engineering Works, Liverpool, his early career was as engineer for various steamship lines, his last engagement being with the Red Star Line, on board the *Pennland*, one of the largest ocean liners of her time. In 1888 Mr. Munro settled in this country and accepted the position of chief engineer for a large oilcloth-manufacturing establishment, at Astoria, L. I., N. Y., remaining there until September 1891, when he became an inspector in the Baltimore office of the Hartford Steam Boiler Inspection & Insurance Company. He was promoted to the position of chief inspector in 1893 and served in this capacity until his death. Mr. Munro became a member of the Society in 1916.

HENRY WEBBER

Henry Webber was born in Bishops Tawton, Devonshire, England, on September 15, 1848. He was brought to this country when about three years of age, his parents settling in Dunmore, Pa., then known as Bucktown. He lived in Dunmore until the time of his death, January 2, 1920.

Mr. Webber served his apprenticeship as machinist with the Pennsylvania Coal Co., in Dunmore shops for four years, then becoming connected with the Dixon Manufacturing Co., of Scranton, Pa. He worked on the floor erecting engines and in the drawing office on blowing engines, and later became foreman of the shop. For a number of years previous to his death he was a mechanical engineer with the Finch Manufacturing Co. of Dunmore.

Mr. Webber was for some time a member of the Engineering Club of Northwestern Pennsylvania, resigning two years before his death. He became a member of our Society in 1886.

WILLIAM E. ROBERTS

Wiliam E. Roberts was born in Horsforth, England, in February, 1859. He was educated in private schools and in Ilkley and Yorkshire Colleges, England.

Mr. Roberts served his apprenticeship with Joseph Whitham & Sons, Leeds, spending two years in the drafting room and four in the various shops of the firm. From 1881 to 1918 he was engaged for periods of from one to four years with the following concerns, thus gaining an unusually valuable experience: Greenwood & Batley, Leeds, draftsman; John Butler & Sons, Stanningley Iron Works, mechanical engineer; Leeds Forge Co., Leeds, chief draftsman; Fox Solid Pressed Steel Co., Joliet, Ill., superintendent; Anaconda Mining Co., Butte, Mont., chief draftsman; W. A. Clark Smelter, Houston, Idaho, master mechanic; Parrot Mining Co., Butte, Mont., Mechanical engineer; F. A. Heinze Smelter, Butte, Mont., construction engineer; Illinois Steel Co., Chicago, checker; Indiana Steel Co., Gary, Ind., checker and designer; Fairbanks, Morse & Co., Chicago, checker and designer; Koppers Coke Oven Builders, Chicago, checker and designer; Willputte Coke Oven Corporation, New York, checker and designer. In 1918 Mr. Roberts became connected with the Foundation Oven Corporation, New York, as superintendent of maintenance and construction in their Chicago office, which position he held at the time of his death, February 23, 1920. He was a recognized expert in the coke-oven industry.

Mr. Roberts became a member of the Society in 1918.

JOSEPH A. CARLOTTI

Joseph A. Carlotti, equipment engineer for J. E. Musselman, consulting engineer, New York, died on May 23, 1920. Mr. Carlotti was born in 1892 in New York City and was educated in private schools. He entered the employ of J. E. Musselman as junior draftsman and received rapid advancement. As chief draftsman he was responsible for the design of the electrical and mechanical equipment of many of the public buildings in the city. During the War he was assistant to the chief of the electrical and mechanical section of the U. S. Navy Yard in Brooklyn, N. Y., returning to his former position in 1919.

Mr. Carlotti became an associate-member of the Society in 1919.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and a pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers: non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

Due to new printing arrangements, it has been necessary to advance all copy dates. Accordingly, copy for advertisements received after October 5 has been held for the next issue. In the future all copy for this section will be due on the fifth of the month preceding date of issue.

OPERATING ENGINEERS. Excellent opportunity for four or five young engineers to enter employment of old and well-established company manufacturing a basic commodity. Opportunity of learning business and developing quickly into supervisory operative position of trust. Good salaries from start but applicants must be willing to enter practical work and demonstrate ability before securing promotion. Successful experience in handling men and production desirable. Excellent opportunity for young men desiring permanent association with a basic and growing business, located in New York. Z-1694.

INSTRUCTORS for large university, in architecture, civil engineering, electrical engineering, mechanical engineering, theoretical and applied mechanics, physics and railway-mechanical engineering. Location Middle West. Z-1701.

MACHINE DESIGNER, with experience and creative ability on development of complicated automatic machinery. American preferred, possessing enough ingenuity and intuition to be able to solve mechanical problems alone. Tool designers, plant, efficiency or production engineers need not apply. Write fully, giving age, experience and patents taken out, if any. Location New York City. Z-1798.

BUSINESS MANAGER. Young man of strong character and ability. Experienced in abrasive manufacture and sales. A great opening for permanent connection, but for a high-class man only. Location Pennsylvania. Z-1986.

COMBUSTION ENGINEER, mechanical-engineering graduate thoroughly familiar with mechanical stokers. Should have pleasing personality and be capable of conducting boiler tests and assuming responsibility. Work in connection with combustion problems. Location Detroit, Mich. Z-2009.

ENGINEER for research work on problems of employment relation. Practical experience in industry and training in economics required. Location New York City. Z-2029.

EXECUTIVE DESIGNING ENGINEER for consulting engineers' office on general municipal work including water works, hydraulic, sanitary, sewage disposal projects, etc. Must have broad general experience, and have sufficient executive ability to take charge of office in principal's absence. Location New York City. Z-2116.

INSTRUCTOR in pattern making and foundry. Location Texas. Z-2119.

INSTRUMENTMAN for engineering department capable later on of becoming assistant. Should be technical graduate of first-rate school and have two or three years' of experience in municipal field. Junior member of A.S.C.E. preferred. Location Pa. Z-2139.

MECHANICAL ENGINEER capable of taking leading part in engineering department as designer-checker for manufacture of general-transmission, saw-mill machinery, oil-field rigs, engines, refinery work of growing concern. Good living conditions. Young man desiring permanent location to grow in service and responsibility preferred. State age, training, experience and salary expected. Location Texas. Z-2145.

WORKS MANAGER, experienced man capable of handling several hundred employees who has made good on intensive machine-shop work envolving duplicate plants made to close limits. Must have faculty of producing at low cost without any sacrifice of quality and have thoroughly demonstrated his potentialities. Foundry experience desirable but not essential. Salary commensurate with capability. Location New Jersey. Z-2149.

INSTRUCTORS in mechanics, mathematics and drawing. Must be graduate engineer. Location Minnesota. Z-2155.

PRODUCTION MANAGER for large printing company with several plants in U. S. and Europe manufacturing printing machinery. Location New York City. Z-2159.

ENGINEERING DRAFTSMEN for automatic machinery. Must be technical graduates and able to make detail drawings from sketches or verbal instruction. Three men needed. Location New York City. Z-2160.

DIAMOND DRILLER with calyx shop-drill experience to go to India. 2-year contract. Location India. Z-2161.

CHIEF ENGINEER for Public Works Department for foreign country. Must have broad experience in all kinds of construction work such as docks, harbor, highways, water-works, etc. Must speak Spanish. Member of

A.S.C.E. preferred. Location West Indies. Z-2174.

ORGANIC CHEMIST to have charge of chemical laboratory. Must be able to direct work and should have at least three years' experience. In connection with experiment laboratory of U. S. Army, Air Service, Balloon & Airship Branch. Location Nebraska. Z-2175.

ENGINEER to look after mechanical end of power plant in China. Plant is about completed and will consist of two 2000 kw. Curtis turbines. General Electric alternators, 3000 hp. boilers, Murphy stokers, superheaters, etc. Must have practical experience. Quarters will be furnished single men and $60 per month will be allowed married men for quarters. Location China. Z-2178.

TECHNICAL GRADUATE along either mechanical or hydraulic lines. Prefer a man with two or three years' experience in construction work who would work into scheming and preliminary stages of hydroelectric work. Location Mass. Z-2180.

MECHANICAL ENGINEER OR DESIGNER, air-compressor expert, experienced in handling general experimental work independently; one able to figure cost and production. State fully experience, references and initial salary. Location New York City. Z-2185.

GRADUATE MECHANICAL ENGINEER, preferably one with a few years' experience in the manufacturing business, to work in various positions in mechanical department, with the hope that within year he would be able to take full charge of department. Work would include maintenance and repair of present equipment, installation of small amount of new equipment, lay-out of new departments, and installation of new machinery. Location Mass. Z-2188.

DESIGNER for feedwater heaters. Must have had experience in this line of work. Location Chicago, Ill. Z-2196.

ASSISTANT EXPERIMENTAL ENGINEER for large sugar corporation with several factories in Cuba and headquarters in Havana. Must be graduate mechanical engineer with sufficient experience in research work (preferably in sugar engineering) to take responsible charge of men, plan work, etc. Knowledge of Spanish desirable though not essential. Prefer single man, age 26-32. Good salary to right man. In writing state salary desired. Z-2200.

MECHANICAL ELECTRICAL DRAFTSMAN with electric-locomotive and multiple-unit-control car experience, as well as wiring and lighting equipment for steam cars. Location New York City. Z-2212.

DESIGNER for plant-layout work with artificial silk-machinery experience if possible. Board work only. Location New York City. Z-2214.

MECHANICAL ENGINEER, technical graduate with machine-shop experience for responsible position. Will report directly to general superintendent. Prefer man between 35 and 45 years. Should have good organizing ability and be experienced in production and inspection of such machinery as steam turbines and reduction gears. Location Pa. Z-2217.

MECHANICAL ENGINEER experienced in shop work and special machinery. Must be able to design and construct machines, also development work in this line. Some drafting. Permanent position. Location Brooklyn, N. Y. Z-2218.

SUPERINTENDENT for machine shop. Must be experienced in machine-shop practice and have worked way up through shop to executive position. Location Ohio. Z-2226.

INDUSTRIAL ENGINEER to take charge of production and office work, cost system already established, practical machine-shop experience necessary. Location Ohio. Z-2227.

FOREMAN of electrical, mechanical-instrument laboratory. Must be technical graduate or have had experience to substitute for such training. Also 3 section leaders with similar experience. Americans only. Location New Jersey. Z-2234.

MECHANICAL ENGINEER for Chile. One with some sales experience and who speaks Spanish. Z-2237.

YOUNG TECHNICAL GRADUATE, mechanical, to assistant chief engineer. Concern manufactures various types of lawn mowers. Should have drafting and design experience on tools, jigs, fixtures and product (small grey and malleable castings) and be capable of taking charge of small drafting force. Would be held responsible for checking and detail work of drafting room and assist in laying out the work for department. Location New York State. Z-2240.

SANITARY ENGINEER and also sanitary and heating draftsmen. Should have plumbing, sewage-disposal and water-supply experience. Four men needed. Location Albany, N. Y. Z-2243.

ESTIMATOR on office and hotel structure. Also brick and steel reinforced-concrete buildings. Location New York City. Z-2245.

TIME-STUDY ENGINEER, with machine-shop operation and adding-machine experience. Able to estimate from blue prints. Only men with this experience will be considered. Location Brooklyn. Z-2252.

YOUNG MECHANICAL ENGINEER, preferably recent technical graduate, for position of sales engineer on steam-plant equipment. Write fully. Location New England. Z-2253.

CONSTRUCTION FOREMEN, two, on frame construction, to erect roller coasters and other amusement devices. Must be able to take full responsibility of field work and to secure speed without waste. Good opportunity for profitable and permanent connection for man who can show results. Must be able to travel. State qualifications and experience, salary desired, etc. Z-2254.

MECHANICAL ENGINEER, must have intimate knowledge of industrial conditions particularly factory conditions, and able to speak convincingly; well fitted to take up subject before employers' associations as well as individual employers. Give details of experience. Location New York. Z-2255.

DRAFTSMAN, with experience in railway-passenger and freight-car construction. Some shop maintenance experience also required. Young man preferred. Knowledge of Spanish desirable but not essential. Location Havana, Cuba. Z-2257.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 5th of the month preceding date of issue and should be limited to 45 words. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

INDUSTRIAL ENGINEER, of sound judgment and proven ability, member of firm of well-known industrial engineers with 14 years' experience designing and equipping plants for varied industries, planning production and devising cost systems, seeks connection with large manufacturer having plants to establish or develop. Location no object, but opportunity to acquire interest as results warrant. SM-5624.

MECHANICAL ENGINEER and EXECUTIVE, 35, M. E. degree, 15 years' engineering experience covering construction of industrial plants, power plants, special automatic machinery, Diesel oil engines. Thoroughly practical with executive ability and not afraid of responsibilities. At present employed as chief engineer, special department, large concern. Desires opening where initiative and experience along above lines are wanted. Present salary $6,000. SM-5625.

CHIEF DRAFTSMAN, or assistant chief engineer desires responsible position with progressive company. Have specialized in design installation and operation of high and low-pressure air, oxygen, hydrogen, acetylene and gas compressors. Experience as testing and erecting engineer. SM-5626.

FACTORY EXECUTIVE, age 32, Stevens graduate. Has worked up through ranks serving successfully as machinist, foreman, designer, plant engineer, superintendent, mechanical engineer and factory manager. Broad experience in all phases of industrial engineering and management. Desires to affiliate with medium-size concern. SM-5627.

MECHANICAL ENGINEER, graduate, 37. Experience as chief engineer, production and sales engineer. Have worn overalls. Know automotive and general mechanical construction and particularly familiar with pressed-steel industry. Prefer sales work in Detroit but will consider any proposition with live concern. SM-5628.

MASTER MECHANIC, American, age 32, 10 years' broad experience in design installation, maintenance and successful handling of labor. Salary $5,000. SM-5629.

HIGHLY-TRAINED MECHANICAL EXECUTIVE, desires position requiring broad-gage man; 20 years' manufacturing experience, acquired as tool-room foreman, general supervisor of equipment, general superintendent, works manager, assistant general manager, and general manager. Have successful record as executive. Familiar and in sympathy with best shop methods. Will gladly furnish detail of experience with references. SM-5630.

MECHANICAL ENGINEER or general superintendent, age 33, married. Eighteen years on connection with mechanical lines, from shop bench to chief engineer and general superintendent in charge of responsible work. Design, productions and inspection of machine tools and product, for quantity production of interchangeable parts. Can get along with all kinds of labor and elements without friction and get results. Location immaterial. SM-5631.

WORKS MANAGER, general superintendent or production engineer, with five years' practical experience in organization, accounting, planning and estimating production and material control in sheet-metal, paint-machine, plating-automobile, woodworking and galvanizing shops employing up to 3000 men. Technical graduate, age 29, minimum salary $7,500. SM-5632.

GRADUATE MECHANICAL ENGINEER, 4½ years' assistant construction and building superintendent, capable of handling men in all building trades, ordering and specifying materials. Three years' designing, i.e., mechanical-plant layouts, structural-steel and reinforced-concrete details, piping and heating and ventilation. References furnished. Salary $360 per month. SM-5633.

MECHANICAL ENGINEER and PATENT ATTORNEY, Technical graudate, 48, with varied experience, including machine design, steam engineering and 9 years' of patent practice; has inventive and literary ability, talking knowledge of German and Russian, and reading knowledge of French. Efficient. SM-5634.

PRODUCTION MANAGER or FACTORY SUPERINTENDENT desires to locate with metal-manufacturing firm located in Philadelphia or immediate vicinity, age 29, married, experienced in up-to-date factory methods and foundry practice. Capable of assuming charge of medium-sized plant including engineering work. Familiar with purchase of materials and has good knowledge of source of supply in Philadelphia territory. Salary commensurate with responsibility. SM-5635.

MECHANICAL-ELECTRICAL ENGINEER experienced in design and manufacture of electrical apparatus. Specialist in development of switches, electro-magnets, contractors, relays, compensators, controllers, etc., for

electric motors. Inventor of numerous commercially successful devices. Salary expected $5,000. SM-5636.

EMPLOYMENT MANAGER and PERSONNEL DIRECTOR, age 31, machinist trade, technical education, 6 years' experience as organizer and executive. Had direct charge of employment, promotion, transfer, safety, education, welfare, women's activities plant paper. Available October 1. SM-5637.

ENGINEER, R. P. I. Cuban, age 29. Capable of designing complete sugar plants. Familiar with types of machine used in sugar industry. Experienced in construction of complete plant. Can discuss changes for improving plant. Speaks both English and Spanish fluently. SM-5638.

MACHINE DESIGNER, technical graduate. Experience on cord-tire-winding machinery, automatic-match machinery, excavating machinery, etc. Strongest qualification, working out mechanism to accomplish required results and reducing same to simple and practical form. Have handled difficult problems. SM-5639.

MECHANICAL ENGINEER, technical graduate. Have made steam turbines my specialty. Three years' practical experience in construction, testing and design of steam turbines. Desires position with growing concern leading to executive responsibilities. SM-5640.

PAPER and PULP MILLS. Member A.S.M.E., married, American; former mill manager, with broad experience in industrial engineering and construction, practical knowledge of manufacturing, office detail and cost accounting, desires opportunity as assistant to executive in administration, manufacturing or in charge of department, where experience, ability and loyalty will meet with just recognition. Excellent references. Recently returned from abroad and available immediately. SM-5641.

PLANT ENGINEER, graduate mechanical engineer, junior member, six years' experience, test, design, construction and operation of steam-electric plants. Four years' public-utility experience office and field. Construction superintendent 3000 kw. industrial plant. Present chief engineer large cereal-products plant. Executive ability. Salary $3,600 Available 30 days notice. SM-5642.

SALES ENGINEER, technical graduate, age 25, married, familiar with big industrial trade in St. Louis and vicinity. At present handling line of power-transmission machinery, wishes new connection with concern in mechanical equipment line to call on same trade. SM-5643.

TOOL DESIGNER, wide experience on jigs, fixtures and gages. Prefer New York City, but would go anywhere. Minimum salary $45. SM-5644.

SALES ENGINEER, graduate mechanical engineer, with ten years' experience in designing, operating and selling power-plant and industrial-plant equipment in metropolitan district, desires position as sales engineer or New York representative. SM-5645.

ASSISTANT PRODUCTION ENGINEER, technical education, 8 years' experience at production and industrial engineering, planning, estimating and designing. Capable of assuming responsibilities and handling men. Have had successful experience as chief tool designer, head of operation layout and planning department and assistant production engineer. Salary $3,000. Vicinity New York. SM-5646.

SALES ENGINEER, 30 years old, married, college graduate in mechanical engineering, home in New York City, wants to sell alloy or tool steels, or represent manufacturers of power-plant equipment. Salary or commission, with prospect or earning over $5,000 first year. Four years of sales experience on power plants. Two years' sales representative for high-grade steel mill. SM-5647.

MECHANICAL ENGINEER, M. I. T., 28, married. One year as electrician, machinist; machine designer. Two years as mechanical engineer on maintenance and new designs. Two years on time study, analysis and improvement of process, factory layouts, standardization, costs. Location New England. SM-5648.

ENGINEER, graduate M. E., 26, desires responsible position in technical or commercial capacity. Four years' experience covering shop, drafting and sales work. Now employed in executive capacity with industrial furnace concern, work entailing design, erection and sales. Present salary $3,100. SM-5649.

FACTORY EXECUTIVE or PRODUCTION MANAGER, age 40, married; 16 years' experience in plant management, including production, plant engineering, plant layout, building construction, maintenance, welfare, fire prevention and safety. Have specialized in manufacture of rubber material. At present employed in this line. Eastern location preferred. Minimum salary $4,800. Can furnish best of references. SM-5650.

SUPERINTENDENT or PRODUCTION MANAGER, college graduate. Eighteen years' practical experience in shops and executive positions. Training in rapid interchangeable productions using most-up-to-date methods, inspection and assembling operations. At present holding position of similar nature but desires change. Location immaterial. SM-5651.

LUBRICATION or SALES ENGINEER, graduate; experience in selecting, testing, and subsequent sale of lubricants in industrial plants. Road experience both from engineering and sales end. Desires connection which assures future for one with pleasing personality, is energetic, and can show results. Will travel. SM-5652.

PLANT EXECUTIVE, or PLANT ENGINEER, at present employed in similar capacity. Age 29. Has also been successful superintendent of large mill. General mill experience, buying, contracting, machine-design and maintenance, shop-operation, air-conditioning, heating, ventilating, and blower work. Salary expected $3,600. SM-5653.

SUPERINTENDENT of construction or maintenance engineer, age 44, desires position as plant maintenance engineer or similar position. Ten years' practical experience and 14 years' experience on plant construction and layout, power-house design and installation. Capable of handling-maintenance and construction and master-mechanic work. Technical graduate, married. Assoc. Member A.S.M.E. Salary $3,600. SM-5654.

REPRESENTATIVE, college graduate, M.S., M.E., 36, linguist, fundamental experience United States; 10 years' service Anglo Egyptian Government in capacity chief appraiser machinery, desires connection with manufacturer of any class machinery oil corporation, automobile or tire concern. Special representative for Egypt, Palestine and Sudan. SM-5655.

MECHANICAL ENGINEER, age 35, 12 years' practical experience on design and construction of special machinery, automatic machinery and machine tools; desires executive position with reliable firm. Good executive. Salary $3,500 per year. Location immaterial. SM-5656.

TECHNICAL GRADUATE, Yale 1919 and 1920. Mechanical and industrial engineering. Desires opening as assistant in production work or with industrial-engineering firm. Location preferably New York City. SM-5657.

INDUSTRIAL ENGINEER, ten years' experience in design, construction, operation of mechanical and electrical equipment, production manager and employment manager. Open for engagement January 1 or before. Permanent location desired in southern states or Pacific coast. American and foreign experience, fluent Spanish, business training. Can handle men, materials and money efficiently. Specialist in design and construction, or rehabilitation, of factories and their organizations. Salary $6,000. SM-5658.

MECHANICAL ENGINEER, 26, technical graduate, two years' machine shop, four years' mechanical draftsman on boilers, steam power-plant piping, heating, fire protection, sprinkler systems, mechanical maintenance for large industrial company, one year mechanical resident engineer on large cotton-mercerizing plant, designing and layout of mechanical section of plant. Available immediately. Salary immaterial. SM-5659.

MECHANICAL and COMBUSTION ENGINEER, American, age 30, graduate M.E. Lehigh Univ. At present correspondent and combustion engineer with large stoker company; desires position with progressive company as assistant engineer. Congenial, wide-awake, good personality. Four years' experience in power plant, including design, testing and operation. Minimum $3,000. Middle West or East desired. SM-5660.

MAINTENANCE ENGINEER, or similar position desired by technical graduate; 20 years' experience on industrial-plant planning, maintenance and construction of buildings and equipment; design; construction and operation of power plants. Good executive ability. Desires permanent connection in responsible position. At present employed; available about November 1. Salary $6,000. SM-5661.

TECHNICAL GRADUATE, ten years' experience; five in shop, drawing-room, estimating and sales department for one concern, and five years as district sales manager for another machinery company. Wishes to connect with small manufacturing business, where opportunity will be given to work into management and buy an interest. References. Married, age 33, and have two children. Prefer Wisconsin, Minnesota or Illinois. Familiar with Missouri, Kansas, Nebraska and Colorado. SM-5662.

SALES MANAGER, graduate mechanical engineer, specialized in merchandizing end of engineering, open for position as sales manager. Has 12 years' broad experience as sales manager and technical publicity manager, with sales of over two million dollars per year. Intimately acquainted with steel business, anti-friction bearing business and power plants. Desires opportunity to demonstrate ability to merchandize high-grade product on national scale, where making good will be adequately compensated. New York headquarters preferred. SM-5663.

MARINE ENGINEER or SUPERINTENDENT ENGINEER, 19 years' experience, shop, maintenance, building installation, operation, inspection and repairs. Drafting of ships, engine boilers and machinery. Technical graduate and chief engineer's certificate. Will go anywhere. $7,200 per annum. SM-5664.

PLANT ENGINEER and MANUFACTURING EXECUTIVE, technical graduate; 15 years' general engineering and contracting experience. At present in entire charge of all construction and maintenance for very large tool manufacturing concern. Used to extensive responsibilities along these and similar lines. Particularly familiar with shipyard management and vessel repairing. SM-5665.

EXECUTIVE, assistant to president or general manager of manufacturing concern. Technical education; 12 years' experience; married, 35; protestant; engaging personality. Best of references. New York City. SM-5666.

MACHINE-SHOP FOREMAN, associate member, age 38, 23 years' practical experience in all branches of trade; have been executive for past 12 years. Have proven to be good organizer and leader of men and can positively guarantee results. SM-5667.

MECHANICAL ENGINEER, broadly trained, technical graduate, age 32; desires executive position with progressive concern or as assistant

to high executive. Ten years' practical experience in machine-shop, drafting-room, industrial-engineering work, and as appraisal engineer. Energetic, resourceful, good personality, excellent results in handling men. SM-5668

MAINTENANCE or PLANT ENGINEER, technically educated, age 38; 16 years' broad engineering experience on organization, design, construction and maintenance of industrial plants and power houses; desires position with progressive concern. Available about November. New England or eastern states preferred. Minimum salary $4,000. SM-5669.

MECHANICAL ENGINEER, age 31, technical and practical experience covering 15 years on design and manufacture of special automatic machinery, machine tools, jigs, fixtures, and dies, plant-engineering, layout and production methods; desires opening as engineer, chief draftsman or assistant to executive. Salary $3,300 with chance to advance. SM-5670.

VICE-PRESIDENT and TREASURER, technical man, broad experience engineering, production, sales, and accounting. Desire larger opportunity. Willing to serve as engineer, production manager or auditor. Salary $7,500. Only first-class Eastern corporations will be considered. SM-5671.

PLANT ENGINEER, superintendent of power, etc., for past three years in charge of both steam and electric ends of 9,000-kva. central station and have shown steadily and materially improving operation. Successful in handling labor under trying conditions and devising simple methods of improving economies. Graduate M.E., married. SM-5672.

SUPERINTENDENT OF MANUFACTURING PRODUCTION or assistant to works manager, age 36, married; executive and practical mechanic. Thoroughly experienced in production and manufacturing. Good organizing executive in tool, gage and die work, routing processing sequences of operation. Can handle office and production charts and maximum at minimum cost. Excellent record during part 5 years as production superintendent and assistant M.E. in factory of 6,000. SM-5673.

MECHANICAL ENGINEER, 38, married, M.E. graduate; 16 years' experience in steam engineering, reciprocating machinery and Unaflow engines, as draftsman, chief, designer, testing, research, superintending, consulting engineer and inventor. Desires suitable position in research, experimental, development or design, preferably steam engineering. Highest references. Resourceful, energetic and capable to take charge. SM-5674.

MANUFACTURING EXECUTIVE, management duties and manufacturing details to be carried on in conjunction with improvements in plant layout, and manufacturing processes, if necessary, selection and purchase of industrial equipment, routing and handling of material, production control by experienced M.E. Married. Present salary $5,200. SM-5675.

CHIEF OPERATING ENGINEER or master mechanic, with wide experience and executive ability. Familiar with engines, steam turbines, boilers, water and fire tubes, and practical machinist and boiler maker. Technical knowledge, and hold a marine and stationary engineer's license. SM-5676.

MECHANICAL ENGINEER, now employed by large steam and electric railway desires position in states. Thirteen years' experience in steam and electric railway work and allied lines. Has filled positions from locomotive special apprentice to shop superintendent, and draftsman to chief mechanical engineer. Would like to enter engineering-sales field. Can speak Spanish and is now in Cuba. Would consider $300 per month. SM-5677.

MECHANICAL INDUSTRIAL PRODUCTION ENGINEER or superintendent, graduate mechanical engineer, age 36, married, 14 years' practical experience, general factory engineering, construction and plant maintenance, designing and building of special improved machinery, labor-saving devices, fixtures and dies for increased production. Broad experience in handling men, shop-processes, material, equipment and tools, organization-production control. SM-5678.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER NOV. 12, 1920

BELOW is a list of candidates who have filed applications since the date of the last issue of Mechanical Engineering. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 133.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by Nov. 12, 1920, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

HENDERSON, Robert M., Vice-President National Pipe & Foundry Co., Attalla

Arizona

GENOVAR, Harry F., Manager, Tucson Office, Chas. C. Moore & Co., Tucson

California

CRONHOLM, Frederick N., General Manager, Imperial Irrigation District, Calexico

HARRIS, Elmer M., Sales Engineer, York California Construction Co., Los Angeles

HILLS, Leslie Wm., Engineer, Hills Brothers, San Francisco

JOHNSTON, Clarence L., Vice-President & Production Manager, Merchant Calculating Machine Co., Emeryville

PERSELL, Edgar C., Standard Oil Co., Richmond

Connecticut

DAVIDSON, Ezra D., Sales Engineer, Farrel Foundry & Machine Co., Ansonia

DECHERD, Kirtland W., The Charles Parker Co., Meriden

DOW, Richard F., Engineer, Whitney Manufacturing Co., Hartford

DOWNS, Harry N., Chief Operating Engineer, Sidney Blumenthal & Co., Shelton

GAITHER, George M., Jr., Winchester Repeating Arms Co., New Haven

HARTEN, John, Division Engineer, Pratt & Whitney Co., Hartford

LANCE, William W., Assistant Mechanical Engineer, Fort Wayne Corrugated Paper Co., Hartford

LEWIS, Richard C., Farrel Foundry & Machine Co., Ansonia

HOULMMEDIEU, Frank' L., Deep River

LOVENSTEIN, Hans J., Vice-President, The Hartford Precision Tool Co., Hartford

MALLOY, John D., Assistant Foreman, The Veeder Manufacturing Co., Hartford

REYNOLDS, Francis J., Salesman, The Bristol Co., Waterbury

RUSSELL, James W., Training Engineer, Winchester Repeating Arms Co., New Haven

SCHICKEL, Norbert H., President, The Schickel Motor Co., Stamford

SCHNUCK, Carl F., Chief Draftsman, Farrel Foundry & Machine Co., Ansonia

SPILLANE, John F., Charge of Electric Generating Plant, Winchester Repeating Arms Co., New Haven

District of Columbia

KARSUNKY, William, Manager, Highway Garage, Washington

Georgia

BRITTINGHAM, Thomas H., Associate, Thos. G. Brittingham, Augusta

ELSAS, Norman E., Assistant, Fulton Bag & Cotton Mills, Atlanta

Illinois

BUCHANAN, James M., District Turbine Specialist, Chicago Office, General Electric Co., Chicago

CARTER, James H., Power Department, Aluminum Ore Co., East St. Louis

GARDNER, Walter A., Mechanical Designer, National Boiler Washing Co., Chicago

HOISINGTON, Harry, Ordnance Engineer, Ordnance Department at Large, Rock Island Arsenal, Rock Island

LAMBERT, Joseph L., Sales Engineer, G. S. Blakeslee & Co., Cicero

LIEBICH, Frank A., Whiting Foundry Equipment Co., Harvey

MARTIUS, Frederick T., Engineer, National Boiler Washing Co., Chicago

MURRAY, J. Vincent, Industrial Engineer, J. Lee Nicholson & Co., Chicago

TUCKER, Raymond R., Safety Engineer, Aluminum Ore Co., East St. Louis

Indiana

CARLISLE, Fred B., Factory Representative, Coöperative Department, Studebaker Corporation, South Bend

HEIDENGER, Henry W., Motive Power Inspector, Pennsylvania System, Terre Haute

HOLMES, John Q., Assistant to Consulting Engineer, Nordyke & Marmon Co., Inc., Indianapolis

Louisiana

JACKSON, Samuel D., A. M. Lockett & Co., Ltd., New Orleans

WYLER, Charles J., Chief Draftsman, A. M. Lockett & Co., New Orleans

Maryland

ALTHEN, George R., Engineer of Distribution, Consolidated Gas, Electric Light & Power Co., Baltimore

COOK, Henry R., Jr., Assistant Chief Engineer, Consolidated Gas, Electric Light & Power Co., Baltimore

COOPER, Chester A., Boiler Inspector, Maryland Casualty Co., Baltimore

Massachusetts

DAVIS, Daniel L., Draftsman, Morgan Construction Co., Worcester

KRULL, Leonard M., Foundry Grinding Engineer, The Norton Co., Worcester

LYNCH, Daniel J., Jr., Computer, General Electric Co., Lynn

TEEL, Lawrence H., Mechanical Engineering Designer, A. C. Lawrence Leather Co., Peabody

WOOD, Thomas A. S., Construction Engineer, Lewis Recovery Corp., Boston

Michigan

GOGAN, Joseph, General Superintendent, Detroit Steel Products Co., Detroit

McGREGOR, Howard L., Assistant to President, National Twist Drill & Tool Co., Detroit

SAYNER, Laurence, Director of Service Training, Lincoln Motor Co., Detroit

Mississippi

PHILIPS, Ran L., Superintendent of Power & Equipment, Gulfport & Mississippi Coast Traction Co., Gulfport

Missouri

EIGENBROT, John L., Superintendent, Station "A," Laclede Gas Light Co., St. Louis

MURRAY, Frederick F., Engineer, Commercial Journal Co., St. Louis

Nebraska

DONNER, William E., Engineer, Henningson Engineering Co., Omaha

New Jersey

ABERCROMBIE, W. Taylor, Jr., Draftsman, U. S. Cast Iron Pipe & Foundry Co., Burlington

BEVAN, Thomas D., Engineer of Power Plants, Central Railroad Co. of New Jersey, Jersey City

CERES, Robert R., Maintenance Machinist, E. I. duPont deNemours Co., Arlington

DeCAMP, Witsel R., Secretary & Works Manager, DeCamp & Sloan, Inc., Newark

FAUNCE, Benjamin W., Progress Engineer, New York Shipbuilding Corp., Camden

HUBBELL, George W., Mechanical Engineer, Babcock & Wilcox Co., Bayonne

HUNTER, Clarence J., Manager, Philadelphia Office, Foster Engineering Co., Newark

JOHNSON, Frederick E., Designing Engineer, Singer Manufacturing Co., Elizabethport

KELLY, Philip M., Inspector, Motive Power Dept., Central Railroad of New Jersey, Jersey City

LISSON, Reuben, Estimator, Babcock & Wilcox, Bayonne

McCREA, C. Leslie, Sales Engineer, Graphoscope Development Co., Newark

O'NEILL, William E., Tool Supervisor, Willys Corp., Elizabeth

OWEN, Charles D., Chief Engineer, Passaic Print Works, Passaic

TRAVIS, James I., Weston Electrical Instrument Co., Newark

New York

BILLIPP, Ernest H., Partnership with John J. Naugle, New York

BURT, Walter R., Miller, Franklin, Basset & Co., New York

CHRISTIE, Morrison, Chief Draftsman, W. J. Wayte, Inc., New York

COLSTON, Robert, Assistant Marine Sales Manager, The Griscom-Russell Co., New York

ECKLER, Harry, Production Engineer, Library Bureau, Ilion

HUDA, Rudolph E., Estimator & Draftsman, N. Y. Refrigerating Machine Department, H. W. Johns Manville Co., New York

KRELLEN, Harry I., Draftsman, S. K. F. Industries, New York

LINDQUIST, David L., Chief Engineer, Otis Elevator Co., New York

McCARTY, Richard J., Jr., Superintendent, Saratoga Division, The Delaware & Hudson Co., Albany

MULLINER, George W., Member of Company, Mulliner Brothers, Syracuse

PARKER, Benjamin M., Assistant Engineer, The R. B. Wolf Co., New York

SMITH, Floyd T., Commercial Engineer, General Electric Co., Schenectady

WILKS, Victor H., Supervisor of Equipment, Dwight P. Robinson & Co., Ind., New York

ZIERICK, Ambrose E., Tool & Machine Designer, Service Engineering Co., Brooklyn

North Carolina

CLOYD, Edward L., Instructor, North Carolina State College, West Raleigh

Ohio

BOYD, Hugh, Engineer, National Carbon Co., Inc., Cleveland

KNERR, Dan G., Assistant Factory Manager, Computing Scale Co., Dayton

LEHNERT, John, Tool & Machine Designer, Timken Detroit Axle Co., Canton

MAXWELL, Robert C., Lebanon

MORRIS, A. Mason, Pittsburgh Valve & Fittings Co., Barberton

RIORDAN, John M., General Manager, The Vahan Products Co., Cleveland

SCHULZ, George H., Mechanical Estimator, Wellman, Seaver, Morgan Co., Cleveland

SCOTT, Harry E., Assistant Chief Engineer, Brown Hoisting Machinery Co., Cleveland

SHANER, Earl L., Engineering Editor, *Iron Trade Review*, Penton Publishing Co., Cleveland

Oklahoma

GILCREST, Murray H., Assistant Superintendent, United States Zinc Co., Sand Springs

Pennsylvania

ALLEN, J. Wallace, Efficiency Engineer, Clairton By-Product Coke Works, Clairton (Re-election)

ASTON, James, Metallurgical Engineer, A. M. Byers Co., Pittsburgh

HOLLANDER, Otto, Marine Draftsman, Bethlehem Shipbuilding Corp., Ltd., Bethlehem

JONES, Yeamans P., Shop Efficiency Engineer, Hess-Bright Manufacturing Co., Philadelphia

KULP, Henry B., Assistant to Master Mechanic, Phoenix Iron Co., Phoenixville

LUCKENBACH, J. Lewis, Designing Engineer, Wilson-Ruff Co., Philadelphia

McLEAN, Crandall D., Draftsman & Checker, Basset & Slaughter, Inc., Philadelphia

MARIS, James C., Shop Representative of Engine Department, Baldwin Locomotive Works, Philadelphia

O'BRIEN, Isaac K., Construction Engineer, Atlas Powder Co., Philadelphia

RECH, Philip D., Junior Engineer, H. S. B. W. Cochrane Corp., Philadelphia

RODGERS, Paul C., Eastern Sales Manager, Phoenix Iron Works Co., Meadville

ROSS, Theodore H., Sales Engineer, Andrews-Bradshaw Co., Pittsburgh

SELDEN, George D., Jr., District Sales Agent, Erie City Iron Works, Erie

SHAFER, Alfred E. M., Draftsman, New Jersey Zinc Co., Palmerton

WEI, Tsen Fu, Draftsman, Bethlehem Shipbuilding Co., Bethlehem

Rhode Island

BUTTERFIELD, Frederick C., Taft-Peirce Manufacturing Co., Woonsocket

WATERMAN, Benjamin F., Designer, Brown & Sharpe Manufacturing Co., Providence

Tennessee

ROBERTS, James T., Jr., Sales Engineer, Walsh & Weidner Boiler Co., Chattanooga

Texas

NORRIS, John A., Board of Water Engineers, Austin

Virginia

DAVENPORT, Frank B., Lubrication Engineer, The Texas Co., Norfolk

GOEBEL, William H., Lubrication Engineer, The Texas Co., Norfolk

WHITE, Albert L., Jr., Draftsman, Newport News Shipbuilding & Dry Dock Co., Newport News

Wisconsin

MAURER, John D., Assistant General Superintendent, Illinois Steel Co., Milwaukee

RILEY, Francis H. M., Representing Manufacturers of Power Plant Equipment in State of Wisconsin, Milwaukee

SCHAFER, Roy, Senior Draftsman, The Falk Co., Milwaukee

Australia

STOWARD, William H., Chief Engineer, Bingera Sugar Plantation, Bundaberg, Queensland

British West Indies

MASCALL, Ernest, Trinidad Leaseholds, Ltd., Point-a-Pierre

West Indies

PETERSON, Garfield C., Manager, Central Machete, Guayama

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

Ohio

BEVER, John J., Manager, Foundry Department, The Otis Steel Co., Cleveland

Oklahoma

HEID, J. Benjamin, Consulting Petroleum Engineer, Tulsa

Pennsylvania

WALKER, Lee E., District Sales Engineer & Assistant Manager, Good Roads Machinery Co., Philadelphia

PROMOTION FROM ASSOCIATE-MEMBER

Connecticut

GREIG, Alexander, Superintendent, The Connecticut Tubing Co., Hartford

Indiana

HUNTER, Samuel R., Manager, Oil Engine Division, Dodge Sales & Engineering Co., Mishawaka

Massachusetts

FAY, Chester H., In charge of Designing, Morgan Construction Co., Worcester

WILSON, Chester W., Superintendent, B. O. & G. C. Wilson, Inc., Boston

New York

LANE, Augustus Hayward, Mechanical Engineer, Cohoes Iron Foundry, Cohoes

Ohio

SEES, Joseph F., Works Manager, Miller DuBrul & Peters Manufacturing Co., Cincinnati

Pennsylvania

McDERMET, John R., Research Engineer, Elliott Co., Jeannette

PROMOTION FROM JUNIOR

California

ROSEN, Carl G. A., Diesel Engineer, Dow Pump & Diesel Engine Co., Alameda

TAYLOR, George E., Head of Engineering Department, Meese & Gottfried Co., San Francisco

Maine

SANDERS, Walter C., Lieutenant, 42nd Railroad Artillery, United States Army, Bangor

Missouri

RYDER, Frederick W., Sales Correspondent, Laclede Christy Clay Products Co., St. Louis

New York

NEWMAN, Paul A., Engineer, Western Electric Co., New York

PALSGROVE, Grant K., Professor, Rensselaer Polytechnic Institute, Troy

TAYLOR, John E., Mechanical Engineer, Locomotive Superheater Co., New York

North Carolina

SHERRILL, Sloan S., Mechanical Engineer, Chemical Construction Co., Charlotte

Ohio

SACK, Edwin L., Designer, Parish & Bingham Corp., Cleveland

SUMMARY

New Applications	122
Change of Grading:	
Promotion from Associate	3
Promotion from Associate-Member	7
Promotion from Junior	9
Total	140

In Two Sections—Section Two

MECHANICAL ENGINEERING

The Monthly Journal Published by The American Society of Mechanical Engineers
at Easton, Pa. General Offices at 29 West Thirty-ninth Street, New York

Volume 42 December 1920 Number 12

Secretary's Letter

EVERYONE has just expressed himself at the polls and orally interpreted the election, but has it ever occurred to you that the real determination of the policy of the United States is by the everyday conduct of each individual rather than the periodic casting of a ballot? What is true of the nation with respect to policy and franchise, is equally true of an engineering society.

We have just about completed one year's administration under Major Fred J. Miller as President, and are soon to enter upon a new administration under Mr. E. S. Carman, the President-elect, who is already busying himself with the selection of members of committees and right here is a great opportunity for members to make a new contract with the work of their profession through participation in one of the Society's various activities. Please do not consider it essential to be specifically invited to do this, for the President-elect will welcome offers of assistance or suggestions of men who are available for committee appointments.

It will be discovered that one's satisfaction with his membership in the Society will increase as he engages in the work of the Society.

Calvin W. Rice, *Secretary.*

A.S.M.E. COUNCIL NOTES

The Council resumed its sessions at a meeting in New York on October 15. There were present: President, Fred J. Miller; Treasurer, William H. Wiley; Vice-Presidents, Fred. R. Low, John R. Allen, Robert H. Fernald, Dexter S. Kimball, John A. Stevens; Managers, C. Russ Richards, E. C. Fisher, Earl F. Scott; Past-Presidents, I. N. Hollis, D. S. Jacobus; Chairmen of Standing Committees; E. S. Carman, Local Sections; George W. Orrok, Publications; Frank F. Law, Representing Finance; Roy V. Wright, Meetings and Program; E. B. Katte, Professional Sections; Secretary, Calvin W. Rice.

Under the new By-Law the officers-elect were invited, and President-Elect E. S. Carman and Vice-Presidents-Elect L. P. Alford and R. B. Wolf attended. By special invitation C. F. Rand, Chairman of the Engineering Foundation Board, Past-President W. F. M. Goss, and I. E. Moultrop, A.S.M.E. representatives on the Board, and Mr. A. D. Flinn, Secretary of the Board, were present. Comfort A. Adams, Chairman of the Engineering Division of the National Research Council, was also present.

Executive Committee. Actions taken by the Executive Committee of the Council during the summer months were confirmed. The most important of these was the providing for our participation in The Federated American Engineering Societies and our representation at the Organization Meeting of the American Engineering Council to be held in Washington November 18–19.

Engineering Foundation. The representatives present explained the work and progress of this movement and announced that the endowment would approximate $1,000,000 within a year.

Special authorization was given to the officers of our Society to coöperate with the other participating Societies in the plan for increasing the endowment.

Fortieth Anniversary. The Council granted a petition of members for a special general meeting of the Society to be held in New York on Friday, November 5, to celebrate the 40th Anniversary of the founding of our organization.

Standing Committees. Annual reports of the Standing Committees were received and ordered printed for distribution at the Annual Meeting.

Budget. The budget of the Finance Committee, of income and appropriations for the new fiscal year, was received, subject to a few slight modifications to provide for recommendations made by the Joint Finance Committee of the Founder Societies.

Spring Meeting. The Society will endeavor to develop this into a Congress of Mechanical Engineers, and will extend invitations to all mechanical engineering societies to send delegates.

WANTED!

Names of Members to Serve on Professional Committees

A great many of our membership are well qualified to serve the Society and the profession on its standards and technical committees, but unfortunately are never given an opportunity for the simple reason that their knowledge and experience are not known to the officers of the Society. If you are one of these and are interested in standardization in any of its many phases, write to the Secretary *today* stating the fields in which you are qualified to work.

Standardization of the dimensions of elements in engineering and machines and the formulation of industrial safety codes are receiving ever-increasing attention in the United States. It is fundamentally necessary for the economic progress of engineering and industry that this be so, and our Society has an important part to play in this work. It must, however, do it through the service of its members on committees, a service which brings its rewards to both the Society and the individual.

Publications. A special vote of appreciation was extended to the Publications Committee for their development of the publications of the Society, notably Mechanical Engineering.

Professional Sections. The new By-Law specifying the duties of the Standing Committee on Professional Sections was adopted.

The petition of members for a Professional Section on Aeronautics was granted.

Awards. The report of the Committee on Awards and Prizes, recommending the following awards, was adopted:

Honorary Membership	Honorable Mention
Life Membership	Scholarships or Fellowships
A.S.M.E. Medal	Junior Medal
Two Student Medals	

The complete report will be distributed at the Annual Meeting.

House. The House Committee, formerly having charge of the rooms of the Society, was discharged with thanks, and its duties were transferred to the Finance Committee.

Boiler Code. Interpretations dated May 24, June 24, and September 24, were approved. These have been published in MECHANICAL ENGINEERING. The resignation of D. S. Jacobus from some of the sub-committees was accepted and appointments made in his place.

Power Test Codes. The report of the individual committee on General Instructions was received and ordered published in MECHANICAL ENGINEERING for discussion.

Education and Training. A new Committee on Education and Training to enlarge the Committee on Relations with Colleges and to include the Committee on Education Below College Grade was authorized, and will be appointed by President Miller. The report of the Committee on Education Below College Grade, making valuable recommendations as to the Society's policy in this field was received and will be published.

Standardization. The Society accepted for the American Engineering Standards Committee the sponsorship for the standardization of shafting, of flanges and pipe fittings, of width across flats on nuts and bolt heads, and for a safety code for the Mechanical Transmission of Power.

Research. John H. Barr was appointed as the Society's representative on the National Research Council. The appointment of George M. Basford as a Trustee of the United Engineering Society was confirmed.

Joint Finance Committee. Recommendations for the financing of The Federated American Engineering Societies and of the Engineering Societies Employment Bureau were approved and will be included in the new budget.

Death of Vice-President Allen. The Council announces with regret the death of Vice-President Allen. Past Vice-President Julian Kennedy and Sumner B. Ely, Chairman, of the Pittsburgh Section, were appointed to attend the funeral services at Pittsburgh, and Past-President M. E. Cooley and Prof. R. C. Anderson, to attend the services at Ann Arbor, Mich.

Washington Meeting. The next meeting of the Council will be held at the New Willard Hotel, Washington, D. C., on November 17 at 6 p.m., in connection with the Organizing Meeting of The Federated American Engineering Societies.

CALVIN W. RICE, *Secretary.*

Standing Committees on Professional Sections Now Established

The Council has now discharged the Special Committee on Professional Sections and it is superseded by the Standing Committee on Professional Sections, which is now a constitutional committee, composed of the following members:

H. E. COFFIN, *Aeronautics* (pro tem.)
F. W. KELLEY, *Cement* (pro tem.)
L. P. BRECKENRIDGE, *Fuels*
G. A. ORROK, *Gas Power* (pro tem.)
L. P. ALFORD, *Management*
F. O. HOAGLAND, *Machine Shop*
R. M. GATES, *Materials Handling*
C. F. HIRSHFELD, *Ordnance* (pro tem.)
A. D. BAILEY, *Power*
E. B. KATTE, *Railroads* (Chairman)
G. H. PERKINS, *Textiles* (pro tem.)

The pro tem. members will be replaced by permanent members as these sections elect their officers. The chairman of the Standing Committee, Mr. Katte, now sits with the Council.

Ordnance Section to Organize

Colonel C. F. Hirshfeld, member of the Special Committee on Professional Sections, has called the organization meeting of the Ordnance Section to be held in the Council Room at headquarters on Thursday, December 9, at 2 p.m., in connection with the Annual Meeting of the Society. All interested are invited to attend.

Railroad Section Meeting a Huge Success

The first meeting of a professional section—the Railroad Section—was held on October 22 jointly with the A.S.M.E. Metropolitan Section and the New York Section of the A.I.E.E., in the auditorium of the Engineering Societies Building. The attendance overtaxed its capacity.

The subject was the relative merits of modern steam and electric locomotives, and papers were presented by John E. Muhlfeld, F. H. Shepard, and A. H. Armstrong. These papers, together with the discussion which followed their presentation, are published in Section One of this issue. The meeting was pronounced a decided success and augurs well for similar professional section events in the future.

Aeronautic Section Petition Granted

The Council at its October meeting granted the petition for the formation of an aeronautic section. The purpose of the section is well explained in the wording of the petition which is here reproduced:

September 27, 1920.

PETITION FOR AERONAUTIC SECTION

TO THE PRESIDENT AND THE COUNCIL:

Gentlemen:

At a meeting of members of the Society held in Detroit, Michigan, on September 27, it was unanimously resolved to petition the Council for the formation of a Professional Section to be known as the Aeronautic Section and to be inaugurated under the provisions of By-Law B-47.

The purpose of this Section will be to organize the members of the Society, and those who may wish to affiliate with them, who are interested in the science and art of aviation.

There are a number of organizations working in this field, and it is believed that the Society has a place among them. It is recommended that the Section, if authorized, coöperate with these organizations to the mutual development of the art.

This petition is presented in accordance with the action of the Special Committee on Professional Sections taken at its meeting on March 11, 1920, and a copy hereof has been sent to that Committee. 201 members have signified their intention of joining the Section if authorized, and those listed on the attached sheet have signed the petition.

Respectfully,
HOWARD E. COFFIN,
Member, Special Committee on Professional Sections representing Aeronautics.

Among others the petition bears the signatures of T. H. Bane, Coker F. Clarkson, James Hartness, M. R. Hutchison, C. F Kettering, C. E. Lucke, Joseph W. Roe, Elmer A. Sperry, S. W. Stratton, J. G. Vincent, Orville Wright.

DOINGS OF LOCAL SOCIETIES

JOINT MEETING AT DALLAS, TEXAS

The Joint Meeting of the Mid-Continent and Houston Sections at Dallas, October 14, 15 and 16, was a gala event for the engineers of the Southwest. The meeting was scheduled during the occasion of the Dallas Fair, which is said to be the greatest attraction of its kind in the southwest.

The Mexican National Exhibit at the Fair, and the presence of the Estado Mayor Presidencial, the finest band in Mexico consisting of 100 pieces, and a party of over 200 Mexican engineers, manufacturers and merchants, furnished an international setting, for the meetings.

The program started with a short business meeting on Thursday the 14th, which was followed by the presentation of professional papers. The members attended the Fair in the afternoon and devoted the evening to banqueting. The morning and afternoon sessions on Friday were devoted entirely to a program of professional papers; and in the evening the members were guests of the Dallas Technical Club at a dinner dance.

Saturday, the closing one of the convention, was spent in jollification—the engineers attending the automobile races at the Fair and a football game between the Universities of Oklahoma and Texas.

The following technical papers were presented at the professional sessions:

Lubricating Oils for Kansas Institutions, J. P. Calderwood, professor of mechanical engineering, Kansas State Agricultural College, Manhattan, Kan.

Evaporation Losses from Crude Oil in the Mid-Continent Field, J. H. Wiggins, asst. engr. Bureau of Mines Experiment Station, Bartlesville, Okla.

Standardization of Drill-Pipe Threads, F. L. Scott, Hughes Tool Co., Houston, Tex.

General Discussion—Oil-Field Boilers.

Flow of Fluids Through Pipe Lines and the Effect of Pipe-Line Fittings, D. E. Foster, of Foster & Gilmore, consulting engineers, Tulsa, Okla. (A continuation of a paper given at the Spring meeting.)

Report of Research Committee, P. F. Walker, Dean, School of Engineering, University of Kansas, Lawrence, Kans.

The Manufacture of Pipe, Chas. Fitzgerald, engineer for The White Oil Corporation; an address illustrated by moving pictures.

Federated American Engineering Societies, H. P. Porter, supt. of gas, water and construction dept. Gypsy Oil Co., Tulsa, Okla.

Helium, Lt-Com. R. G. Walling, U. S. N., Fort Worth, Tex.

Cement and Cement Manufacture, Wm. Moehler, general supt. Texas Portland Cement Co., Dallas, Tex.

Cleveland Felicitates President-Elect Carman

Sixty members of the Cleveland Section of A.S.M.E. met for dinner at the Hotel Statler, on the evening of Tuesday, October 12 to pay their respects to Major Miller, President of the A.S.M.E., and to celebrate the announcement of the election of E. S. Carman as president of the Society for the coming year. Mr. Herron, chairman of the Cleveland Section, presided. President Miller and Secretary Rice made the trip to Cleveland to officially notify Mr. Carman of the honor which had come to him and which he so richly deserved. "Father" Beahan, a director of the American Society of Civil Engineers, represented the Cleveland Engineering Society and was the speaker of the evening. He felicitated Mr. Carman upon his election and briefly told just why the membership at large had made the choice.

The City of Cleveland was represented by W. E. Davis, Commissioner of Light and Power, who expressed pleasure that so great an honor had been conferred on a Clevelander.

Among the guests present were W. P. Brown, representing the Cleveland Engineering Society, S. E. Doane representing Cleveland Section A.I.E.E., E. P. Roberts, of Akron, F. K. Smith, president Osborn Manufacturing Co., and W. H. Searles, of Elyria.

Recent Section Meetings

Akron:

October 29. Fuel of the Future, by Professor E. O. Ellenwood, Goodyear Tire & Rubber Co.

Atlanta:

November 5. Inspection trip in the afternoon to the Federal Prison. History and Development of the Society, by Earle F. Scott and Dr. J. S. Coon.

November 23. Manufacture of Cotton Goods, by J. T. Wilke, of Atlanta, Ga.

Baltimore:

November 4. Joint meeting with Engineers' Club of Baltimore. Inspiring Outlook Before American Engineering, by M. L. Cooke, Philadelphia, Pa.

Boston:

October 19. Inspection of the Fore River Shipbuilding Co., Quincy, Mass. Address on shipbuilding subject.

November 5. Conditions in the Far East, illustrated, by John R. Freeman. Early Days of the Society, by F. W. Dean. Mayor Peters also spoke.

Birmingham:

November 5. Trip through the American Cast Iron Pipe Co. Plant, Sloss-Sheffield Steel & Iron By-Product Plant and the Preston Motor Corp. Auto factory. Dinner and meeting in the evening at Southern Club.

Chicago:

October 22. Railroad Situation of Today, by W. J. Finley, of the Chicago Northwestern R.R.

Cleveland:

October 12. Dinner and Celebration of Mr. Carman's election as President of the A.S.M.E.

November 5. Mr. W. R. Warner addressed Anniversary Meeting at the Business Men's Club.

Columbus:

November 5. Observations During my Recent European Trip, by Col. Edward A. Deeds, Dayton, Ohio.

November 12. Design and Construction of the Uniflow Boiler, by Howard J. Webster, Uniflow Boiler Co., Philadelphia, Pa.

Connecticut Section:

Waterbury:

October 29. Joint meeting with New Haven American Chemical Society. Production of Lead, illustrated with Motion Pictures, by John R McGregor, Asst. Gen. Store Mgr., Eagle Pecher Lead Co.

Coming Section Meetings

Akron.

December 17. In the rooms of the Engineering Society of Akron, 80 So. Main St., Akron, Ohio. Pres. E. S. Carman will speak.

Atlanta.

December 28. Carnegie Library. Impressions of the Annual Meeting, by N. C. Harrison, Atlantic Steel Co., Atlanta, Ga.

Boston.

December 17. Joint meeting with the Civil Engineers. Subject: Water Powers of New England.

Buffalo.

December 21. At the University Club. Subject: Industrial Application of Electric Furnaces, by E. F. Collins, General Electric Co.

Columbus.

December 10. In the Engineers' Club Room. Southern Hotel. Subject: Emergency Work in Power Plant Operation, by E. A. Hitchcock, Dean Eng. College, Ohio State Univ. Movies of A. M. Byers Genuine Wrought, Iron Pipe Manufacturing.

Connecticut Section.

Hartford.

December 6. At City Club. Subject: The Prevention of Grinding Wheel Accidents, by A. Rousseau, Norton Co., Worcester, Mass. The Art of Grinding Becomes a Science in 1920, by W. H. Chapman, Norton Co., Worcester, Mass.

Detroit.

December 3. Joint meeting with Michigan Heating and Ventilating Society. Subject: Modern Efficiency of Heating and Ventilating, by Dr. Hill.

Metropolitan.

December 3. Joint meeting with A.I.E.E. and the Taylor Society in the Engineering Societies Building. The Long Day in the Steel Industry, a problem in the engineering of men, by Fred J. Miller, Pres. A.S.M.E. The Three Shift System in the Steel Industry, by Horace B. Drury, Recently with Industrial Relations Div., U. S. Shipping Board. The Point of View of the Manufacturer, by Wm. E. Dickson, Vice-Pres. Midvale Steel & Ord. Co.

Philadelphia.

December 13. Joint meeting with A.I.E.E. of Philadelphia at the Engineers' Club, Subject: Superpower Survey, by W. S. Murray, Chairman of the Superpower Survey, Dept. of Interior.

Washington State.

December 15. At the Engineers' Club. Subject: Mechanical Engineering of Public Buildings, by E. L. Weber, Consulting Domestic Engineer.

Bridgeport, Meriden and New Haven:
November 5. Excursion to plant of Seamless Rubber Co., New Haven. After dinner speech on Observations in Europe, by Mason Britton, Business Mgr. of "American Machinist," N. Y. C. Developments of Superpower, by W. S. Murray, N. Y. C.

Hartford:
October 18. The Superpower System, by John A. Stevens, Lowell, Mass. Also W. S. Murray, Consulting Engineer, N. Y. C.
November 5. The Development of the Pumping Engine, by Prof. Arthur M. Greene, Jr., Rens. Poly. Inst., Troy, N. Y.

New Haven:
October 13. Hydro Power Developments in Connecticut with Special Reference to the Housatonic River and the Dam at Stevenson, by A. J. Campbell and Mr. Hughes of the Connecticut Light & Power Co.
October 21. Joint meeting with Winchester Engineers Club. Dry Cells, by D. H. Gleason. Industrial Motor Control, by Prof. L. W. W. Morrow, Yale University, New Haven. Mechanical Reproduction of Pictures, by Coit Colburn. Motion Pictures on the Anatomical Structures of the Heart and Microscopical View of the Blood Circulation.

Detroit:
November 5. Henry M. Leland, address on the History of the A.S.M.E. An Engineer's Observations in Europe, by E. J. Mehren, Editor of the *Engineering News-Record*.

Eastern New York:
November 15. Tendencies in Modern Armament, by Brigadier General W. I. Westervelt.

Indianapolis:
November 5. Past and Future of Engineering, by Dr. C. L. Mees, Pres. Rose Poly. Inst., Terre Haute, Ind.

Los Angeles:
November 5. Prof. C. C. Thomas addressed meeting.

Metropolitan:
November 17. Joint meeting with A.I.E.E. and A.S.C.E. Urban and Suburban Passenger Transportation.

Ontario:
November 5. Queenston-Chippawa Power Development of the Hydro-Electric Commission of Ontario, by Prof. R. W. Angus.

Philadelphia:
November 5. Smoker at Hotel Adelphia. Manufacture of Tobacco, by Ben Lichty, Vice-Pres. Eisenlohr Co., Philadelphia, Pa. Dr. Hollis also addressed the meeting.

Providence:
November 5. Oil Refining, by Dr. K. G. Mackenzie, Consulting Engineer, Texas Co.
November 6. Trip through East Providence Plant of the Standard Oil Co.

San Francisco:
November 4. Excursion to the Mare Island Navy Yard.

St. Louis:
November 5. Dean C. R. Richards, Univ. of Illinois, addressed the meeting. Motion pictures of C. H. Howards Steel Foundry.

Syracuse:
November 4. Prof. Dexter S. Kimball addressed the meeting.

Washington, D. C.:
November 5. The American Society of Mechanical Engineers, by Prof. Robert H. Fernald, Univ. of Penn., Philadelphia, Pa. Points on Burning of Fuel Oil, by Lt-Comm. W. R. Burnell, Navy Yard, Philadelphia. Manufacture of Gas as an Industrial Fuel, by Thos. King, Supt. Fuel Sales, Consol. Gas, Electric Light & Power Co., Baltimore, Md. Flow Meters, by C. L. Davison, General Electric Co., Philadelphia. The Coal Situation, by Prof. Robt. H. Fernald.

Washington State:
November 5. Joint meeting with Student Branch, Univ. of Washington, at the Faculty Men's Club.

NECROLOGY

MITCHELL COFFIN

Mitchell Coffin, member of the firm of S. M. Ryder & Son, Niagara Falls, N. Y., died on February 6, 1920. Mr. Coffin was born on September 27, 1889, in Brooklyn, N. Y. He was graduated from the Massachusetts Institute of Technology in 1912, receiving his B.S. in mechanical engineering. From graduation until the time of his death, he was a member of the firm of S. M. Ryder & Son, engaged in the designing and manufacture of machinery.

Mr. Coffin became a junior member of the Society in 1913.

HOBART D. FRARY

Hobart D. Frary, assistant professor of steam and gas engineering, University of Wisconsin, died on August 15, 1920. Professor Frary was born in Minneapolis, Minn., on April 28, 1887. He was educated in the Minneapolis schools and received his M.E. from the University of Minnesota in 1908 and his M.S. in 1909. He studied in the University of Göttingen in 1913–14 and in 1918 received his Ph.D. from the University of Illinois. Professor Frary had held the positions of instructor in engineering mathematics, University of Minnesota, mechanical engineer and magnetic observor, yacht *Carnegie*, Carnegie Institution; instructor in mathematics, University of Iowa, and engineer in the Forest Products Laboratory. He became connected with the University of Wisconsin in 1919

Professor Frary was a member of the honorary societies of Tau Beta Pi and Sigma Xi. He became an associate-member of our Society in January, 1920.

CHARLES OSCAR KLOCKARS

Charles O. Klockars, vice-president and general manager of the Essex Foundry, Newark, N. J., died on September 18, 1920. Mr. Klockars was born in Finland on August 14, 1878, and came to this country at the age of eleven. Two years later he started work at sweeping floors in the tapping room of the Malleable Iron Fittings Co., Branford, Conn. He was advanced to the position of assistant foreman at the age of eighteen. Later he was transferred to the machine shop as machinist and toolmaker apprentice. He worked at these trades for ten years.


Charles O. Klockars

After private tutoring he entered Pratt Institute, Brooklyn, N. Y., in 1906 and was graduated in 1908 from the mechanical engineering course. His first professional work was in the engineering department of the Crane Co., Bridgeport, Conn., where he spent two years. In 1910 he entered the employ of Essex Foundry as superintendent and served in that capacity until his appointment in February, 1920, to the office of vice-president and general manager.

He was completing at the time of his death a continuous pouring machine for molding steam fittings, which would increase production 50 per cent. Several other labor-saving machines were designed and built under his supervision at Essex Foundry.

Mr. Klockars became an associate of the Society in 1911. He belonged to a number of clubs and several fraternal organizations.

ERNEST GEORGE HENDERSON

Ernest G. Henderson, general manager and president of the Canadian Salt Co., Ltd., Windsor, Ont., died on October 20, 1920. Mr. Henderson was born in Holywood, County Down, Ireland, on September 14, 1858. He was educated at the Hillbrook School and College, Belfast, and was apprenticed for four years as pupil to the engineer of the Belfast and County Down Railway. He was then appointed assistant engineer, Ulster Division, Great Northern Railway of Ireland. In 1883 he went to Canada and engaged in surveys and construction of the main line of the C.P.R. Later he was appointed assistant engineer, C.P.R., Toronto, and then resident engineer, C.P.R., London, Ont. He resigned in 1883 to erect the plant of the Canadian Salt Co., then known as the Windsor Salt Co., of which concern he became vice-president and general manager, and finally president in 1917.

Mr. Henderson was a member of the Civil Engineers of Ireland, the Canadian Society of Civil Engineers, the American Chemical Society, the Society of Chemical Industry and ex-president of the Canadian Manufacturer's Association. He became a member of our Society in 1916.

JOHN FINDLEY MORRIS

John Findley Morris, superintendent of maintenance of the Portsmouth Ohio, Works of the Whitaker Glessner Co., died on March 25, 1920. Mr. Morris was born in Altoona, Pa. on December 1, 1869. He was educated in the grammar and high schools of Steelton, Pa., and served his apprenticeship in the shops of the Pennsylvania Steel Co. From 1890 until 1911 he was connected with the following firms in the various capacities mentioned, thus obtaining a wide and varied experience: the Vulcan Road Machine Co., foreman machinist; Pennsylvania Steel Co. in slabbing mill, bessemer and pumping plant; Ensign, U. S. Navy during the Spanish-American War; shop foreman for Thomas Edison; assistant master mechanic, South Works of the Illinois Steel Co., Chicago; master mechanic, Dominion Iron & Steel Co., Sydney, N. S., Canada; assistant general master mechanic, Lackawanna Steel Co.; superintendent of construction of the Millikin Brothers Steel Co.; shop foreman and superintendent of M. H. Treadwell Co.; master mechanic with the Glessner Co., Porthmouth Works. From 1916 to 1917 he was connected with the Algoma Steel Co., Sault Ste. Marie, as

superintendent of maintenance. He returned to the Glessner Co. at the end of that period to assume the position which he held at the time of his death.

Mr. Morris belonged to a number of clubs and fraternal organizations and was especially interested in the civic affairs of Portsmouth. He became a member of the Society in 1918.

CHARLES KOPP

Charles Kopp, chief engineer of the Norit department of Joseph Baker Sons & Perkins Co., Inc., New York City, died on October 11, 1920, in Donaldsville, La., while in charge of the erection of new machinery used with the Norit in refining sugar. Mr. Kopp was born on February 25, 1890, in Chicago, Ill. He was educated at the Hebrew Technical School and Cooper Union, New York City. From 1908 to 1918 Mr. Kopp was associated for varying periods with the following firms: the Mosher Water Tube Boiler Co., Westinghouse, Church, Kerr & Co., Gibbs & Hill, E. L. Phillips Co., and the Honolulu Iron Works Co., all of New York City. He was also consulting engineer for the American Burtonizing Co., Staten Island, N. Y., resigning from this firm to take the position he held at the time of his death. Mr. Kopp became an associate-member of the Society in 1919.

PATRICK NOBLE

Patrick Noble who was president of the Pacific Rolling Mill Co., San Francisco, Cal., and who played such an important part in the early development of the iron and steel industry on the Pacific Coast, died on October 2, 1920. Mr. Noble was born in Abbeville, S. C., on January 14, 1849. He served during the last year of the Civil War in the Confederate Army, having just reached his sixteenth year.

In 1868 he went to San Francisco where he started work with the Pacific Rolling Mill Co., then a very small mill in its early stages. From that time Mr. Noble was associated with the mill in various capacities, finally becoming general manager. In 1898 he took over the entire business and operated it until the time of his death.

As the mill was located at such a distance from the Pittsburgh region and transportation facilities were poor, the equipment had to be developed in great part without any previous experience or plans from which to work. Mr. Noble was responsible in a very large degree for the reputation achieved in this direction by the mill.

He was graduated from Charleston College and was a member of the Engineering Society of Western Massachusetts and of several clubs of San Francisco. He became a member of our Society in 1892.

PERSONALS

Mayo D. Hersey, who for over ten years has been a physicist at the United States Bureau of Standards, and recently chief, Aeronautic Instruments Section, Washington, D. C., is now connected with the Massachusetts Institute of Technology, Cambridge, Mass., as associate professor of Properties of Matter, Department of Physics.

Harold B. Smith, listed in the 1920 Year Book under New London, Conn., should be listed under Worcester, Mass. Although Professor Smith served as consulting engineer for the Special Board on Submarines at the Naval Experimental Station, New London, Conn., he has maintained his residence in Worcester, where he is professor of electrical engineering, consulting engineer, and director of the Electrical Engineering Department at Worcester Polytechnic Institute.

G. Shirmer has resigned his position as sales engineer with the Whiting Foundry Equipment Company and is now associated with W. C. Bennett, industrial engineer, Chicago, engaging in all branches of foundry and industrial engineering, designing, superintending and equipping of complete installations.

F. E. Pierce and John Skogmark, formerly associated in business as Pierce & Skogmark, Inc., announce that they are now connected with the firm of L. L. Summers & Co., New York City.

J. M. Henry announces his transfer from the position of assistant research engineer of the Pratt & Whitney Co. to the publicity department of the Niles-Bement-Pond Company, New York City. He will also have charge of the publicity connected with the Pratt & Whitney Co. products.

A. A. Shimer, formerly at the Flower Observatory, Upper Darby, Pa., is now connected with the Hercules Power Company, Brunswick, Ga.

C. E. A. Gronbech is now factory manager for the Edgar E. Kahn Corporation, Keene, N. H. He was formerly connected with the C. J. Tagliabue Mfg. Co., Brooklyn, N. Y. as superintendent and assistant factory manager.

A personal item concerning Harry A. Schwartz which was published in the November number of Mechanical Engineer is incorrect. The membership of the Society includes two members of the same name. Mr. Schwartz of The Defiance Machine Works, Defiance, Ohio, has made no change in his position. The other Mr. Schwartz, who was formerly with the Indianapolis office of The National Malleable Castings Company, is now manager of research, Research Laboratory, in the Cleveland branch of The National Malleable Castings Company.

James A. Elliott, formerly chief accountant, Cooley & Marvin Co., Boston, announces that a partnership, under the firm name of Elliott, Davis & Co., has been formed between himself and Herbert T. Davis, also of Cooley & Marvin Co. The new company will conduct a general practice of public accounting. The main office is in Boston; a branch office is located in New York.

D. G. McMillan, formerly with The Singer Mfg. Co., and more recently with The Williams Printing Company, New York, as maintenance engineer, has resigned to become superintendent of power with the Willys Corporation, Elizabeth, N. J.

F. M. Bond, who for the past six months has been manager of the Corticelli Silk Mills (Nonotuck Silk Company) at Leeds and Haydenville, Mass., has been appointed general manager in charge of all the mills of the Company, with headquarters at Florence, Mass.

Philip J. Werner, for the past nine years with the Panama Canal, inspection department, has resigned his position and is now in charge of construction for the Stanley Company of America, Philadelphia, Pa.

J. N. Eley, a consulting engineer of Atlanta, Ga., is a new Member of the Society. He was erroneously listed as a Junior in the list of New Members of the Society published in the October issue of Mechanical Engineering.

Kenneth Watts, who for the past seven years has been in charge of the Gasoline plants and producing properties of the Oklahoma Petroleum and gasoline Company of Tulsa, Okla., is to take charge of the operation of a large oil company in South America. Mr. Watts will visit his home in Bridlington, England, before taking up his new work.

W. D. Mann, formerly with the American Incandescent Heat Company, is now combustion engineer in the engineering department of the Petroleum Heat and Power Company, Boston, Mass., formerly Fess Rotary Oil Burner, Inc.

Charles M. Reed has recently accepted the position of power engineer for the Portsmouth Cotton Oil Refining Corporation, Portsmouth, Va. He was formerly assistant to the steam engineer, American Sheet and Tin Plate Company, Pittsburgh, Pa.

John D. Spalding, formerly chief draftsman, Smalley-General Company, Bay City, Mich., is now associated with the Westinghouse Air Brake Company of Pittsburgh, Pa.

Edward H. Tait, formerly general manager, Emerick Mill Company, Easton, Pa., is now vice-president and general manager, Greenwich Mfg. Co., Reading, Pa.

Thomas B. Wilson has been appointed steam engineer in charge of the newly organized department of steam engineering at the Maryland plant of the Bethlehem Steel Company, Sparrows Point, Md. He was formerly steam engineer for the Cambria Steel Company and for the past two years has been on combustion work for the Du Pont Company, Wilmington, Del.

A. Padron, who for some years has represented in Brazil the Kelvin Engineering Co., Inc., of New York, has been appointed general manager of Kelvin Engineering Co., Inc. of Brazil, a subsidiary company of the former engaged in the sale of sugar machinery in Brazil.

Hugh E. Steele, who has been with the machinery sales department of W. R. Grace & Co., importers and exporters, for the past nine years, has left that firm to open an office as consultant on machinery exporting, New York, N. Y.

R. A. Seaton has been appointed Dean of the Division of Engineering and Director of the Engineering Experiment Station at the Kansas State Agricultural College, to fill the vacancy made by the resignation of Dean A. A. Potter. Previous to his appointment as Dean, Mr. Seaton was professor of Applied Mechanics and Machine Design and in charge of the Road Materials Testing Laboratory.

David Moulton, formerly assistant mechanical engineer for Monks & Johnson, Boston, Mass., is now with the Walworth Mfg. Co., Boston.

F. R. Greyson announces that he is now connected with the Cerro de Pasco Copper Corporation at La Fundicion, Peru, where he will be located for at least two years. He has been with the Lackawanna Steel Company of Buffalo, N. Y., for the past year.

Raymond W. Muller, formerly service engineer for Walter Kidde & Co., New York, is now works engineer for The Vulcan Detinning Company, Sewaren, N. J.

C. E. Burgoon has resigned as staff assistant to the Director of the Division of Supply and Sales, U. S. Shipping Board, Emergency Fleet Corporation, to accept a position as properties and records engineer with the Cuba Cane Sugar Corporation, Havana, Cuba.

George W. Cravens is now vice-president and general manager for the Universal Body Corporation at Mishawaka, Ind.

W. A. Smith is now connected with the Acheson Graphite Company, Gredag Department, Niagara Falls, N. Y., in the capacity of development engineer.

James D. Mooney, until recently assistant to A. P. Sloan, Jr., vice-president of the General Motors Corporation, has been made general manager of the Remy Electric Division of that corporation, Anderson, Ind.

David S. Wegg, Jr., has left the employ of the Allis-Chalmers Mfg. Co. to become associated with W. A. Gilchrist of Chicago as electrical engineer.

George A. Evans is now with the Grasselli Chemical Company as head of the power department, Grasselli, N. J. He was formerly assistant to mechanical engineer, Public Service Electric Company, Newark, N. J.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and a pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers: non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society's records.

YOUNG MAN to give instruction in shop practice by correspondence. Should be high-school graduate with either training or experience in machine-shop work and some knowledge of pattern making and foundry work. Location Pa. Z-2064.

CONSTRUCTION FOREMEN, two, on frame construction, to erect roller coasters and other amusement devices. Must be able to take full responsibility of field work and to secure speed without waste. Good opportunity for profitable and permanent connection for man who can show results. Must be able to travel. State qualifications and experience, salary desired, etc. Location Pa. Z-2254.

GRADUATE MECHANICAL OR CIVIL ENGINEER to make engineering studies and calculations of problems connected with iron and steel manufacture. Also work on patent specifications in relation to the steel industry; technical catalogs and engineers' handbooks. Should have keen analytical mind and thorough understanding of engineering technics. Give full particulars regarding education, experience and other details which will indicate personality; photograph also of interest. Location Pa. Z-2266.

ASSISTANT PROFESSOR to teach descriptive Geometry and machine drawing in southern university. Should have teaching and practical experience Z-2271.

MECHANICAL ENGINEER familiar with design and operation of all forms of drying machinery and Japanning ovens. Should have some intimate contact with this class of machinery, and especially in construction of same. Location N. Y. City. Z-2276

MASTER MECHANIC for phosphate mine. Must be able to do repair work for cars, locomotives, mining machinery and general shop work. Location Florida. Z-2282.

EXPERIENCED GLASS MAN to take entire charge of glass works, both hand and machine bottles. Must understand machines making glass and production end. Give full details of experience, age, salary, expected and reference, in first letter. If not an A No. 1 glass man, do not answer this ad. Location Va. Z-2285.

SPECIFICATION WRITER on interior work for ships. Must have marine experience in this line. One man needed. Location N. Y. City. Z-2292.

GRADUATE ENGINEER, age about 25. At least one year of business experience. Sales experience not necessary, but definite adaptability to selling and desire for future in sales rather than production, engineering or purchasing fields. Outside of selling experience, purchasing experience first and production experience second as valuable in applicants. Fair salary to start and advances as value to the company increases. Straight salary only. Above salary can offer exceptionally thorough training in merchandizing, and opportunity for advancement as years go on. Apply by letter. Location Indiana. Z-2302.

EDITOR experienced in power-plant work. Two men needed. Location New York City. Z-2306.

CHIEF DRAFTSMAN. Should have experience on condenser and centrifugal pump work, but not altogether necessary, provided he is able rapidly to familiarize himself with this class of work. Greatest importance that he have executive ability and be capable of handling men with necessary discipline together with tact. Location Pa. Z-2314.

SALESMEN to sell marine machinery and contractors' supplies in Metropolitan District. Man with established New York City trade in this line of business or who has sold similar material in other sections of country. Buying experience with knowledge of sources of supply on material of this kind. Location New York City. Z-2315.

SPECIALIST experienced in forming and heat treatment of punches, dies, turning and cutting tools and like attachments of stationary machines. Must be able to supervise manufacture and maintenance of entire small-tool equipment of large industrial plant. Location Newark, N. J. Z-2317.

MECHANICAL ENGINEER, preferably technical graduate, having steam power-plant experience to assist in preparation of technical-book manuscripts and in other steam-engineering work, largely of desk and detail character. Ability to write good English essential. Teaching experience desirable. Desire well-balanced painstaking engineer. Good future. Give age, education, experience and salary expected. Location Missouri. Z-2318.

ELECTRICAL and MECHANICAL ENGINEER familiar with seagoing hopper-type suction dredges and hydraulic suction pipe-line dredges, also with steam and gasoline tugs and launches. Will be expected to assist superintendent of dredges in operation and repair of fleet of 6 dredges with attendant plant. Applicant should give educational qualifications, employment history, age and all other pertinent information. Will be expected to undergo civil service examination for appointment to grade of junior engineer or superintendent. Location Texas. Z-2323.

SALES MANAGER for company manufacturing pulverized-fuel machinery. Man with combustion experience desired but one with sales experience in foundry or power plant machinery will be considered Location United States. Z-2324.

SALESMAN for company manufacturing water-purification machinery. Should have experience in textile mills or power plants or know these companies. Sales experience absolutely necessary. Man under 27 will not be considered. Two men needed. Location New York City. Z-2325.

DESIGNER to make drawings, etc., for blast-furnace plants and mines. One with experience in laying out blast-furnace or power-plant equipment, or both, would be preferred. Salary will depend on experience and ability of man. Location Pa. Z-2327

MECHANICAL ENGINEER with means to join advertiser in organization of factory for production of spools, bobkins, kindred products for textile mills. Must be capable of designing tools and machines. Location Eastern Canada. Z-2328.

ENGINEER, technical, French nationality with broad American mechanical and commercial experience in design, construction, installation and operation of machinery. Position requires residence abroad and applicant must have thorough command of French. Appointment will be made by letter only, giving age, nationality, experience and salary desired. Z-2330.

GRADUATE MECHANICAL ENGINEER between 25 and 30 years old, for company manufacturing ball bearing. Must possess self-reliance and confidence. Successful, etc. Location New York City. Z-2354.

YOUNG ENGINEERS for mechanical design and development work, preferably with several years of design and shop experience. Location New Jersey. Z-2355.

MECHANICAL DESIGNER familiar with development of small apparatus for manufacture in large quantities. Must have experience with manufacturing and tool-development problems and be able to follow development through designing, tool development and early manufacturing stages. Location Pa. Z-2356.

MECHANICAL ENGINEER; two or three years' experience in power-plant operation. Must be capable of working with chief engineer, in getting better results from boiler and engine room. Installation consists of approximately 2200 boiler hp. and total electric load of 5500 kw-hr. In addition we have numerous problems of power distribution which require investigation of technical man. Location New York City. Z-2357.

ENGINEER experienced in designing and making shop drawings for special machines. One with experience in design of saw-mill machines and woodworking plants. Such experience not essential, if man is practical. Must be willing to go to shops in Middle West and carry on work, after three or four months of preliminary work in New York. Z-2359.

TURBINE ENGINEER. Experienced in the design of Curtis and Curtis-Rateau turbines. Must be able and willing to train and supervise one or more calculators. Salary in accordance with experience and ability. State experience in full, when available and approximate salary desired in first letter. Location Conn. Z-2367.

CALCULATOR. Young man mathematically inclined to learn design and calculation of steam turbines. Technical training and knowledge of thermodynamics desirable but not essential. Location Conn. Z-2368.

CHIEF INSPECTOR for plant in Middle West manufacturing electrical machinery. Work to cover both mechanical-parts inspection and electrical inspection of sub-assemblies. Technical man desired, 30 to 40 years old with broad experience in manufacturing work. Good executive and able to coördinate his work with that of other departments without friction. Location Ohio. Z-2370.

SURVEYOR for work with oil company in South America. Z-2371.

STEAM EFFICIENCY ENGINEER, college training, about 25 years old, experienced in steam-conservation work in industrial plants. Young man with initiative, who can work into organization and finally fill responsible position. State age, married or single, experience, references, Location Chicago. Z-2373.

PETROLEUM ENGINEER, must be able to inspect and report merits of large prospects anywhere from Nova Scotia to Mexico, etc. Experienced men only will be considered. Z-2375.

YOUNG COLLEGE MAN as assistant to chief engineer on power-plant records and tests, also industrial heating and motor application. State experience if any, education and salary wanted. Location Michigan. Z-2377.

ENGINEER experienced in wood-making machinery. State in detail experience. Location Baltimore, Md. Z-2397.

UNITED STATES CIVIL SERVICE EXAMINATION

SENIOR ENGINEER, Grade 2. C.E. E.E. M.E. Signal, Structural, Telephone and senior Architect. Salary $2500 and bonus.

ELECTRIC DRAFTSMAN. War Dept. Application received until March 7, 1921. Salary depends on experience.

SUPERINTENDENT OF ELECTROPLATING. Salary $3000 to $4500. Application to close Dec. 7, 1920.

SUPERINTENDENT OF CONSTRUCTION. Application to close Dec. 7, 1920. Salary $2500–$3000.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 5th of the month preceding date of issue and should be limited to 45 words. The form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

CHIEF ENGINEER or SUPERINTENDENT, Age 33, married, thorough practical mechanic, 15 years' personal contact with manufacturing problems including design and building of modern tool, and machine equipment; also installation and operation of same. Detroit preferred. SM-5680.

INDUSTRIAL ENGINEER, age 31, technical graduate, 8 years' practical experience, 3 years as industrial engineer in connection with installation of Gantt and Barth systems, familiar with time study, scheduling and routing production, cost accounting, etc., 5 years designer of power plants, coal and ash-conveying systems, industrial plants, transmission machinery, labor-saving devices, heating and ventilating, fire-protection systems. Accurate draftsman at present employed, desires change. Advancement rather than initial salary chief consideration. SM-5681.

MECHANICAL ENGINEER, with over 20 years' experience desires new connection as chief engineer for office. Past experience in designing, constructing supervising of construction and erection in various branches of mechanical engineering, including artificial refrigeration, heating and ventilating; 41, married, can show successful record; best of references as to ability and character. SM-5682.

MECHANICAL ENGINEER, 38; 15 years' experience as designer and construction superintendent, including power-plant work, industrial and general engineering. Thorough knowledge of modern steam-power plant, design and construction. Familiar with engineering economics. SM-5683.

GRADUATE MECHANICAL ENGINEER, 1½ years sales-engineering experience in mech. dept. of large rubber company; 1½ years' experimental and development work in Engineering Division of Ordnance Dept. in U.S.A. At present employed; desires permanent position in East with manufacturer of power-plant or other essential engineering apparatus. SM-5684

ENGINEER, mechanical, assistant, 29, technical graduate. Ten years' experience, layout, checking, calculations, on machinery, machine tools, tools, instruments, interchangeable manufacture, inspection of castings, etc. Position desired assistant to engineer; systematic; salary $50. SM-5685.

SUPERINTENDENT or Industrial Engineer, Cornell Graduate, 36, married; 14 years broad and thorough manufacturing experience beginning with machine-shop training including 3 years as industrial engineer installing modern shop methods of manufacture, cost and production control; 7 years' executive experience in factory operation and management; 4 years in present position. SM-5686.

MECHANICAL ENGINEER, 8 years of electro-mechanical designing, 3 years practical shop work; age 28, married. Would like designing and drafting work in spare time, or as assistant to drafting instructor. SM-5687.

CONSULTING MECHANICAL ENGINEER, specializing in design, construction and installation of automatic or labor-saving machinery for factories. SM-5688.

MECHANICAL ENGINEER, technical graduate, 35, married, 15 years' experience in machine and tool design, plant layout, production, power-plant and experimental work. Desires position as production engineer, industrial research man, or executive. Experienced on interchangeable manufacture, small sheet-metal stampings and woodwork. Can get results. New England preferred. SM-5689.

MECHANICAL ENGINEER, technical graduate, 25, married. Fundamental practical training obtained in shops before and during university course; 14 months in Army, two years' experience in research work. At present employed, desires change to position offering future. Salary $200. Vicinity Philadelphia, Pa. preferred. SM-5690.

ENGINEERING EXECUTIVE, experienced in machinery, tools, plant layout, equipment and scientific investigations to build up production and quality. Work has covered manufacture of electrical devices, metal parts in quantities, experimental developments, woodworking, porcelain and power equipment. Possess thorough knowledge of best machinery and modern methods of manufacturing. Salary moderate if position is permanent, and recognized abilities would assure good future. Desire location within 200 miles of New York City. SM-5691.

MECHANICAL-ENGINEERING GRADUATE, 29, emerging from experimental undertaking of varied mechanical nature involving design, shop, and laboratory experience, desires affiliation in manufacturing line. Previous experience in lubrication engineering where close insight and study of numerous manufacturing methods was possible. SM-5692.

MECHANICAL ENGINEER, 45, technical graduate; experienced in design of steam engines and turbines, with broad knowledge of heat-power engineering, until recently employed by U. S. Navy in important position, desires position as executive designing engineer with company manufacturing power-generating machinery in quantity. SM-5693.

MECHANICAL ENGINEER, graduate Michigan University, 32 years, married. Open for position as purchasing engineer or material supervisor; 8 years' experience in engineering and material problems from buying of raw materials to selling of factory scrap, including study of scrap prevention. SM-5694.

MECHANICAL AND EFFICIENCY ENGINEER, American, 27, technical graduate. Experienced in combustion, maintenance, operation and testing of large power plants; wide awake, progressive, executive ability. Desires connection with growing company offering opportunity for advancement. Salary commensurate with position. SM-5695.

GENERAL OR WORKS' MANAGER, 20 years' manufacturing experience acquired as general manager, factory manager, chief engineer and superintendent. Have successful record as executive. Especially qualified on factory construction, equipment, organization, production and costs. Have recently placed two industries on paying basis. Technically trained, expert mechanic. SM-5696.

MECHANICAL ENGINEER, age 34, technical graduate with 7 years' experience in power-plant design, general operation, and combustion problems especially. Have made special study of power-station economics and can handle all phases of betterment work. Salary $4000. SM-5697.

MECHANICAL ENGINEER, technical graduate, 31, practical in machine shop; thoroughly experienced in designing tractors special production machinery, jigs, fixtures and dies for production in great quantity; experienced in production methods and plant equipment; good on work of mathematical and technical character. Location Middle West. $3000. SM-5698.

WORKS ENGINEER, maintenance or executive engineer along these lines. Position desired where 17 years' experience in design, maintenance and alteration of industrial plants will be appreciated. Have also experience in very close limit interchangeable production engineering. Last salary $5200. SM-5699.

ASSISTANT TO PRODUCTION ENGINEER or MANAGER, graduate, 6 years' experience as electrical and mechanical engineer in manufacturing and railway work. At present employed but wishes to connect with progressive manufacturing firm in New York City or vicinity. Age 29 years. SM-5700

STEAM POWER-PLANT SPECIALIST, 15 years' experience, operation and maintenance of electric railway, light and factory power plant. Two years' testing and experimental work. Past three years in charge construction of power plants in Orient. Desires executive position commensurate to his experience. SM-5701.

INDUSTRIAL EXECUTIVE, superintendent of metal-manufacturing plant with successful production experience wants permanent position with opportunities for advancement. Graduate mechanical engineer with shop experience. Have obtained results as head of production department of large corporation and in present position. SM-5702.

WORKS MANAGER OR SUPERINTENDENT, 18 years' practical manufacturing experience, 3 years' industrial engineer, installing cost, production and office methods, 4 years works manager; 6 years foreman and superintendent. Have organized and built up two industries from beginning. Thoroughly familiar with principles of modern manufacturing methods. A1 cost accountant. Certified traffic manager. Now works manager, but desire permanent connection with growing progressive concern. American, 37, perfect health. Available 2 weeks from date of agreement. SM-5703.

EXECUTIVE position desired by American, graduate engineer, age 40. Member of A.S.M.E. and A.I.M.E.; eighteen years broad engineering experience in responsible positions with first-class corporation. Extentensive experience in management cost analysis, including supervision of construction, designs and estimates. Can arrange for New York interview. SM-5704.

MANUFACTURING EXECUTIVE, expert on cost and production-control problems; 12 years' practical experience including reorganizing and systematizing of industries. Have also supervised: process inspection, plant layout, employment, welfare and safety engineering. Familiar with tools, machine tools, iron and brass foundries, boiler shop and tube mill. Age 32. SM-5705.

TECHNICAL GRADUATE, C.E. Mechanical experience. Open-hearth steel production, educational. Age 27. Desires to locate vicinity Troy, New York. SM-5706.

PRODUCTION ENGINEER, graduate of M. I. T. Well acquainted with production systems, time study, lay-out work in foundry and machine shop. Has held important executive positions. Honest, tactful, industrious, persistent. Desires permanent position. SM-5707.

CHIEF ENGINEER, works engineer or similar connection by practical and technical man with broad and varied foundry and rolling-mill experience; ability to handle men and get results. Thoroughly familiar with costs, records, engineering, construction and maintenance of foundry buildings and allied tools and equipment. SM-5708.

SUPERINTENDENT, 35, experienced in sheet metal manufacturing such as building material, metal windows, heating and ventilating, flume, culverts, tanks, etc. Experience in cost systems, installation of equipments, arrangement of plant and handling of material; also in field on metal flumes and irrigation projects. Pacific Coast preferred. SM-5709.

MECHANICAL ENGINEER, Captain Ord. Dept. U.S.A., about to be discharged. Thirty years' experience as designing and constructing engineer on cotton mills, power plants, industrial buildings, chemical plants and small arms. Available on drafting board or in field, either foreign or domestic service. SM-5710.

EXPERIMENTAL AND MECHANICAL ENGINEER, and expert gage maker and executor of over 20 years' experience, desires position. Best of references. East preferred. SM-5711.

MECHANICAL ENGINEER, technical graduate, 33, married; 13 years' broad experience as chief draftsman, plant engineer and chief engineer, in design construction and operation of industrial plants and equipment. Considerable selling experience along machine-tool, mechanical and general factory equipment lines. Desires position of responsibility with engineering, manufacturing or selling organization. Salary commensurate to responsibility. SM-5712.

SALES ENGINEER will represent first-class company which requires service of experienced engineer to look after interest in various Government Departments at Washington, D. C. Now doing this class of work and sufficient time available for another good company. SM-5713.

MECHANICAL ENGINEER and Executive. 34, technical education; practical shop experience. Six years as executive along mechanical lines in office, engineering and shop management. Thoroughly familiar with modern methods. Desires connection in East. Minimum salary $4000. SM-5714.

EMPLOYMENT MANAGER in industrial establishment planning to organize employment department in near future. Duties to consist of questions and problems of industrial relationship between employer and employee. Experience substantiated by 7 years' practical work in human-engineering field. SM-5715.

MECHANICAL ENGINEER, Stevens Institute of Technology, age 24; one year as assistant to manager of large power plant, maintenance, general supervision, costs and boiler testing. SM-5716

SUPERINTENDENT OF POWER, chief engineer or master mechanic; 14 years' practical and theoretical training in electric power plants and steel mills, desires change. Specialist in combustion of coal and economic power production and distribution. Very successful in design of additions and construction under operating conditions. Married, 31; minimum salary $3600. SM-5717.

FACTORY SUPERINTENDENT, or efficiency engineer in automobile or motor-parts industry; 15 years' experience; last five in above named. Will go to any section of U. S. and certain parts of Canada. SM-5718.

GENERAL MANAGER, who has successfully developed specialized machinery-manufacturing business, engaged both in domestic and export trade, now available. Thoroughly competent engineer, also attorney. Equally capable in organizing, selling or developing product. Prefer connection with moderate-sized company capable of large expansion and offering future worth giving up a $10,000 a year position. SM-5719.

MECHANICAL ENGINEER, 32, technical graduate, married; 10 years' experience in shop, design, construction, maintenance, estimating, standardization and investigating work. Desires position of

responsibility with industrial or consulting-engineering concern. Middle West preferred. Salary $3600. SM-5720.

PRACTICAL MECHANIC AND ENGINEER, in steel-plate construction, in capacity of superintendent of boiler shop. Familiar with scotch marine, fire and water-tube boilers. Organizer and producer. At present employed, but desires to change. Best of references. SM-5721.

PRODUCTION ENGINEER or Superintendent. Age 37; 18 years' general machine-shop experience. Thoroughly familiar with shop and central-planning department management. Minimum salary $4000. SM-5722.

SALES AND PURCHASING ENGINEER, with wide experience with nationally-known machinery-manufacturing corporation, having purchased home in Southern California, desires to connect with responsible Los Angeles concern where past experience will be of value. Especially familiar with direction of machinery sales, organization of traveling and office-sales forces, including publicity, preparation of printed matter, advertising, dealer agencies, etc.; purchasing of machinery and supplies; production and various applications of compressed air; sale and application of pumping and mining machinery. SM-5723.

ASSISTANT ENGINEER, two years' experience in design and manufacture of motor trucks and automobile gears; two years' broad experience in modern production and control methods including time and job analysis, planning and routing, rate setting, stores control, etc., two years' active service with Engineer Corps in A.E.F. Desires permanent connection with progressive concern offering attractive future, location immaterial. Age 27, married, now employed. Available December 1. Salary $3000. SM-5724.

PRODUCTION SUPERINTENDENT, 22 years' practical experience in building and designing special machinery tools and dies. Capable of installing practical manufacturing methods, piece work or premium systems. Expert on interchangeable parts. Can handle factory which employs 1000 to 1500 men. Open for position January 1, 1921. Location desired Chicago, Ill. SM-5725.

MECHANICAL AND POWER ENGINEER, age 28, single; technical graduate; B.S. and M.E. Six years' experience along broad lines; chemical manufacturing; machine shop, metallurgy, sugar engineering, industrial and power-plant practice and operation, layout, design, calculations, steam heating, research, etc. Has business and executive ability and can handle men. Desires connection as mechanical engineer, works engineer, or in similar position. SM-5726.

FACTORY SUPERINTENDENT, metal stampings. American, age 27. Twelve years' experience in manufacture of metal stampings. Thoroughly familiar with modern production methods, and close observer of costs. Employed as foreman clitting machinery, foreman power-press department, manufacturing superintendent, and production engineer. Successful in handling labor. SM-5828.

ENGINEER, executive, foreign trade. Age 32. Also member Institute Mechanical Engineers (London). Possesses exceptional commercial knowledge, initiative and foreign-trade technique in addition varied engineering experience embracing shopwork, inspection and supervision important governmental contracts, purchase and sales large quantities machinery. Now engaged as chief engineer influential export concern. Will shortly be open contract with progressive concern to act as special representative or would consider taking charge engineering department large machinery or export firm. SM-5729.

ENGINEER MANAGER, at present asst. gen. mgr. upstate New York corporation. Has previously reorganized and modernized methods and personnel, centralized control and changed three plants permanently from losing to dividend-paying basis in metal goods and hardware, automatic machinery and instruments, and paper-goods lines. American stock, age 36, bonus arrangement required. SM-5730.

GRADUATE MECHANICAL ENGINEER. Age 30; 7 years' engineering experience. At present assistant to engineer in charge of construction work on industrial buildings, power plants and foundries with duties, estimating, purchasing, supervisions of drafting, handling correspondence with field and administrative work. Wishes position with manufacturing or engineering concern. Salary $300 per month. SM-5731.

MECHANICAL ENGINEER, spare-time work. Present position allows 15 or more hours per week to outside work. Not averse to night and Sunday work if necessary. Can handle drafting, testing materials, and all general engineering work. References furnished. SM-5732.

WORKS MANAGER and superintendent of industrial manufacturing plants. Available January 1, 1921. American, age 44; 15 years' successful operation of manufacturing plants in South, Southwest, West and East. SM-5733.

SALES ENGINEER, 35; 10 years' experience in engineering. Also manager Philadelphia territory for Western concern for three years. Desires new connection with good live firm to cover mill and factory trade. SM-5734.

MECHANICAL ENGINEER, 27, Cornell graduate; designing and construction experience on hoisting machinery and rotary kilns; also 1½ years in Naval Aviation and Commercial flying. Desires position with automobile or airplane concern. SM-5735.

INDUSTRIAL AND MECHANICAL ENGINEER 38. Technical training; 14 years' experience resident and professional. Executive control methods and organization for increase of production and sales; planning, scheduling and dispatching of time and materials; elimination of wastes; establishing standards and incentives; bettering methods and processes and lowering costs. Four years as operative supervisor and consulting engineer for nationally known industrial engineering concern. Now employed. Desires responsible position with progressive California concern. SM-5736.

MECHANICAL ENGINEER. Technical graduate, 27; five years' experience as designer, experimental engineer and executive's assistant, chiefly on light accurate interchangeable products. Two years' experience on automobile lighting and ignition equipment. Desires position of responsibility with ample opportunity for promotion. SM-5737.

SERVICE ENGINEER, desires position in service, sales or engineering departments of industrial plant. Experience covers hoisting, mining and paper-working machinery, cranes and boilers. Age 29. New York or Philadelphia vicinity preferred. SM-5738.

ASSISTANT TO WORKS MANAGER or superintendent. Technical graduate, married, four years' machine-shop experience on varied class of work as assistant to superintendent of shop employing thousand men. Desires connection with progressive smaller concern. Salary $3000. SM-5739.

TECHNICAL GRADUATE, mechanical, age 25, with plenty of drafting and designing experience on automobile and motor work desires to change to some line of work other than designing. Have good training in heat treatment and metallography. Would like position with promising future. Preferred location lower Michigan. SM-5740.

MECHANICAL ENGINEER, Technical Graduate; 12 years' experience in design, planning, time study, bonus systems, organization of new departments and equipment for new processes, expert in accurate mass production. Desires connection with progressive concern in executive capacity. SM-5741.

PLANT OR CHIEF ENGINEER. Young American. Served as chief engineer, plant engineer, systematizer and consulting engineer for foundries and large corporations. Thoroughly practical man having started at bottom. Forceful executive and organizer, successfully handling both men and women. Desires to make change to growing concern. Willing to invest and to take part of salary in stock of company. Best of references. SM-5742.

MECHANICAL ENGINEER, 18 years' experience in maintenance, design and production as foreman, master mechanic, chief draftsman, chief engineer and production engineer. Desires position as superintendent, chief draftsman or industrial engineer with progressive concern offering opportunities for advancement. Location immaterial; willing to go abroad. Salary $4500 in U.S.A. Salary abroad according to location. SM-5743.

SALES ENGINEER, mechanical, technical graduate, with broad experience and successful record in sale of power-plant apparatus and mechanical equipment of industrial plants and buildings, desires position with company where ability to engineer and close large contracts for above or similar lines is required. SM-5744.

MECHANICAL ENGINEER, 14 years' experience in charge of designing work and general supervision of production equipment, for manufacture of small parts. American born, age 37; married. Salary $5000. SM-5745.

ENGINEERING EXECUTIVE, graduate in mechanical engineering and business administration. Three years division superintendent electric railway, power and light company. Since war assistant engineer in charge of construction, supervising purchases, designs and correspondence between office and field, on power plant and factory construction. Minimum salary $3600. SM-5746.

GRADUATE ENGINEER, 46. Structural experience with fabricating companies and engineers. Lately in charge of several squads, supervising design and drawings for industrial structures of various kinds, letting contracts, also correspondence. Similar position desired or one as sales engineer with manufacturing company. SM-5747.

MECHANICAL ENGINEER, recent graduate with considerable experience in production and tool designing in automotive industry. Exceedingly anxious to locate in Pacific coast states or other mild sections of country on account of mother's health. Will consider fair offer in any line, providing I should feel confident. SM-5748.

FACTORY OR MECHANICAL SUPERINTENDENT; 20 years' varied experience with executive and mechanical ability. Technically trained in addition to being practical mechanic. Competent on manufacturing, designing and bonus or piece-rate systems. Connection desired with concern that wants man with ability to produce results. Age 36; will furnish best of references. SM-5749.

GRADUATE MECHANICAL ENGINEER, age 26; married. Four and half years' engineering experience including machinery estimating, design, ordnance work and plant installations. Desires position as assistant engineer with industrial concern. Prefer location New York City or vicinity. SM-5750.

EXECUTIVE position as works or plant engineer, superintendent or master mechanic, wanted by man of broad experience. Ability to handle men and accomplish results; 15 years' experience on production of medium and heavy machinery, engine pumps, air compressors, conveyors, air, steam water and gas piping. Expert on coal and water-gas equipment. American; married. SM-5751.

GRADUATE MECHANICAL ENGINEER, age 30; married. Broad experience along line of pressed steel and other metals. Recently sales manager for company making automobile and truck frames. SM-5752.

SALES ENGINEER, with 20 years' experience as engineer and salesman in eastern part of U. S. Desires to connect with reliable company. SM-5753.

FACTORY MANAGER INDUSTRIAL ENGINEER, highly trained executive, thorough manufacturer and capable organizer, with exceptional ability to get quality and quantity production at reduced costs; user of positive methods of management, stores, production and cost control; 18 years' intensive experience in manufacturing lines, holding executive positions in plants turning out machine-shop, foundry, sheet-metal, chemical and electrical products; immediately available. Age 38. SM-5754.

MECHANICAL ENGINEER, Graduate M.E. and C.E. Yale. Experienced in design of special machinery, sugar and textile machinery, tractors, small-arm tools and inspection, is open for engagement as executive chief engineer, for manufacturing plants, or for research designing or purchasing. East preferred. SM-5755.

SALES ENGINEER, thoroughly familiar with power-house equipment, steel plants, blast stove, steel manufacture, engines, and gasoline motors. Last five years sold well-known insulating material; 35 years of age, employed at present. Position wanted with New York City as headquarters where broad engineering experience is of value. Salary $3500 and commission. SM-5756.

MANAGER, supervising engineer, or superintendent; 20 years' varied experience, exceptional executive and mechanical ability, judgment and tact, technically trained engineer in addition to being practical mechanic. Can develop progressive methods and processes for quality, quantity and low cost in shops and factories in growing concern or work out new enterprises. SM-5757.

EXECUTIVE, sales manager and engineer. Ten years of such experience with very large electrical manufacturers; also four years as executive in automobile factory including production and branch management. Military service during war, Tank and Tractor Division Ordnance, Field rank since army discharge. Editorial work. Age 35, married. SM-5758.

MECHANICAL ENGINEER, with 10 years' experience in small tools. Last three years spent with large export concern as estimating engineer on both machine tools and small tools; seeks permanent connection as technical correspondent, sales engineer or estimator. Location immaterial if position satisfactory. SM-5759.

PRODUCTION AND INDUSTRIAL ENGINEER, age 28, with experience in time-study work, production, standardization, installation of systems, planning and routing, drafting and machine shop, desires connection with growing concern as assistant superintendent, production or efficiency engineer. Middle West preferred. SM-5760.

CORNELL GRADUATE, 20 years' experience in design, construction, operation and maintenance of steam electric-power plants, water works, rail-

road and shipyard plant and equipment, gas plants, and heating and ventilating systems; extensive experience in sales of heavy power equipment and construction contracts, purchase of machinery and supplies. Accustomed to handling construction work and sales negotiations. Can produce results. Successful in handling large units of labor, and in negotiations with executives of large interests. SM-5761.

MECHANICAL ENGINEER, Columbia, age 28, single. Five years' experience on construction work, electrical and mechanical apparatus and in all departments of large electric light and power company. Prefer position concerned with efficient generation, transmission and utilization of power. SM-5762.

MECHANICAL ENGINEER, Purdue University. Age 36. Wide and varied experience in management of large iron foundry and machine shops, doing heavier classes of work. Successful in handling all classes of labor. Executive of proven ability, desires position of works manager or general manager in East. SM-5763.

WORKS MANAGER OR SUPERINTENDENT. Technical education, backed by 23 years' successful executive experience. Thorough technical and practical knowledge of up-to-date organization. American, 48 years old. Practical mechanic and mechanical engineer. Especially well trained in manufacture of high-precision quantity production. Served 18 months in Ordnance Department with rank of Major; good clean record. Desires to locate with progressive business, where proven ability will be recognized. SM-5764.

INDUSTRIAL AND PRODUCTION ENGINEER, seeks position installing routing, time-study and shop-efficiency methods to reduce costs and obtain production control. M.E. 1914, age 29; married. Six years' experience shop foreman, tooling, routing, time study, control of production, machine shop layout. Desires future. Now employed. SM-5765.

SUPERINTENDENT, machinist tool maker by trade, technical graduate, wide experience organizing, planning and handling help in plants where interchangeable parts are manufactured. At present holding responsible position. Age 35; salary $5000. Eastern territory. SM-5766.

PRODUCTION AND EQUIPMENT ENGINEER 28 years old, married, American; technical graduate, 7½ years' experience in machine shop, testing, designing, time study, plant equipment and new designs, factory layouts, standardization and efficiency work in production. SM-5767.

EFFICIENCY ENGINEER, College graduate. Mechanical and electrical engineer fifteen years. Experience in planning, maintenance, systematizing and standardizing in shop and drafting room. Desires position as Executive. Detroit, Michigan preferred. SM-5768.

New Members of the Society

In the October issue of MECHANICAL ENGINEERING there was published a list of those who had qualified for membership in the Society since the 1920 Year Book went to press. This was complete to August 1. The following list includes those attaining membership from that date to October 20. The grade is indicated by the symbol after the name; i. e., M-Member; A-Associate; AM-Associate-Member; J-Junior.

AGEE, Howard H.—M, Allentown, Pa.
AINSWORTH, William P. E.—J, Rahway, N. J.
ALDEN, Vern E.—AM, Baltimore, Md.
ALDRICH, Clarence E.—AM, Detroit, Mich.
ALLEN, Ernest C.—AM, Milwaukee, Wis.
ALLEN, Harold A.—AM, West Dudley, Mass.
ALLEN, Hugh L.—AM, Toledo, Ohio
ALLEN, Maynard C.—M, Rivermiss, Mo.
ALTHAUSE, N. K.—AM, New York, N. Y.
ALTPETER, Frank C.—M, Milwaukee, Wis.
ALVORD, Robert W.—J, Hartford, Conn.
ANDERSON, Gustave A.—AM, New York, N. Y.
ANDERSON, John—M, Milwaukee, Wis.
ANDREWS, Edward Vail—M, Milwaukee, Wis.
ANGUS, Robert A.—M, New York, N. Y.
ARKILLS, Murvin E.—M, Seattle, Wash.
ARMOUR, James W.—J, Detroit, Mich.
ATWATER, William C.—AM, Camp Funston, Kans.
ATWELL, Oswald B.—AM, Chillicothe, Ohio
AUGUSTUS, James M.—J, Cleveland, Ohio
AYERS, Fred W.—AM, Newark, N. J.

BADGE, Francis James—AM, Brooklyn, N. Y.
BAGLY, William L.—AM, Tracy, Cal.
BAKER, Linnaeus E.—M, Fort Wayne, Ind.
BAKER, William—J, Toledo, Ohio
BANINGER, John H.—M, Jamestown, N. Y.
BARNES, Harold B.—M, Denver, Colo.
BAUER, Frank S.—AM, Boulder, Colo.
BAZLEY, William H.—M, Cambridge, Mass.
BECKWITH, Earl L.—AM, Detroit, Mich.
BEHAR, Manuel F.—AM, Camp Benning, Ga.
BELLOFF, Arthur B.—J, Kearny, N. J.
BENT, Walter G.—M, Wealdstone, Middlesex, Eng.
BENTEL, Albert—J, Bronx, N. Y.
BEYER, Bertrand E.—AM, New York, N. Y.
BEYER, William W.—M, Norristown, Pa.
BISSELL, Robert W.—M, Long Beach, Cal.
BLAIR, George W.—M, Mishawaka, Ind.
BLISS, William C.—J, St. Louis, Mo.
BLISS, William D.—M, Milwaukee, Wis.
BLIZARD, John—M, Pittsburgh, Pa.
BLOUCH, Levi H.—AM, Chicago, Ill.
BOGART, Adelbert N.—M, New York, N. Y.
BOGUSZ, Walter J.—J, Newark, N. J.
BOLGIANO, Clarence P.—AM, Annapolis, Md.
BOLLER, Frank J.—AM, New York, N. Y.
BOWLER, Roland T. E.—AM, Baltimore, Md.
BRAGG, James W.—M, Sydney, Australia
BRANCHE, Arch Eugene—J, Cleveland, Ohio
BROCK, Arthur, Jr.—M, Philadelphia, Pa.
BROTHERTON, Walker P.—J, St. Louis, Mo.
BROWNE, Bard—AM, New York, N. Y.
BURKE, Henry M.—M, North Dighton, Mass.
BURLINGAME, J. H.—AM, Cincinnati, Ohio
BURNS, Robert—M, Buenos Aires, Argentine, S. A.

CALDWELL, David D.—J, Camp Pike, Ark.
CALKIN, James S.—J, Auburn, N. Y.
CANDEE, Allan H.—AM, Milwaukee, Wis.
CARROLL, W. M.—M, Dayton, Ohio
CHAMBERLAIN, S. H., Jr.—J, Endicott, N. Y.
CHANCE, Thomas M.—M, Philadelphia, Pa.
CHAPMAN, William H.—AM, Worcester, Mass.
CHRISTMAS, John K.—J, Boston 11, Mass.
CLOTWORTHY, Harris A.—J, Baltimore, Md.
COE, Raymond Savage—AM, Poughkeepsie, N. Y.
COLDWELL, Everett S.—AM, Bridgeport, Conn.
COLE, Robert T.—M, Buffalo, N. Y.
COLLINS, Charles Ransom—J, Detroit, Mich.
COLSON, Eric G.—AM, New York, N. Y.
CONNOLLY, Edward A.—J, Brooklyn, N. Y.
CONNELL, Wm. Henry, Jr.—M, Pittsburgh, Pa.
CROCKETT, Renwick Elvin—A, Omaha, Neb.
CRONEY, P. Alfred—AM, Wilmington, Del.

DAVIDSON, Wm. H.—AM, New Orleans, La.
DAVIS, Charles C.—AM, Birmingham, Ala.
DAVIS, Guy Erwin—M, Groton, Conn.
DECHANT, Frederick Hagman—M, Reading, Pa.
DETRAZ, Edward W.—J, Cincinnati, Ohio
DEWEY, William F.—J, Housatonic, Mass.
DEXTER, Albert J.—M, Chicopee Falls, Mass.
DONNELLY, Russell—AM, New York, N. Y.
DYER, Orville K.—M, Buffalo, N. Y.

EBERLE, Fred H.—AM, New York, N. Y.
ECKLER, Elmer Ellsworth—AM, New York, N. Y.
EICHHORN, T. F.—J, Wilmerding, Pa.
ELFRING, John B.—AM, Cincinnati, Ohio
ELY, Allen J.—J, Elizabeth, N. J.
ENGELHARD, Frederick H.—A, Springfield, Mass.
ENGSTROM, Karl E.—AM, Buffalo, N. Y.
ERLINGER, George J.—J, New York, N. Y.
ERSLEW, Albert J.—AM, Brooklyn, N. Y.
EVELETH, Charles F.—M, New York, N. Y.

FASSETT, Francis H.—J, Dayton, Ohio
FELICIANO, Indalecio—M, Caloocan, Rizal, P. I.
FINCH, Raymond J.—M, Schenectady, N. Y.
FINNEGAN, Joseph B.—M, Chicago, Ill.
FITCH, Harold W.—J, Bangor, Me.
FITZ, Gerald Jos. A.—AM, Akron, Ohio
FLEDDERMANN, H. C.—M, Havana, Cuba
FOGEL, William P.—AM, Dayton, Ohio
FOWLER, Arthur N.—AM, New Britain, Conn.
FROELICH, Clarence H.—M, Bethlehem, Pa.
FROESCH, Charles—J, New York, N. Y.

GALLALEE, John M.—M, Madison, Wis.
GARRETT, Robert E.—A, Philadelphia, Pa.
GATES, Leroy G.—M, Bakersfield, Cal.
GATJE, Frederick C.—J, Oriente, Cuba
GIBBS, Alfred W.—M, Philadelphia, Pa.
GILLETT, John—J, Toledo, Ohio
GISLER, Joseph F.—AM, Palo Alto, Cal.
GOLDSTON, Leonard—J, Weehawken, N. J.
GOODRICH, Miles E.—J, Stamford, Conn.
GREGORY, Harold DeL.—J, Washington, D. C.

HAHN, Emanuel—J, St. Louis, Mo.
HAINES, C. M.—J, Middletown, Conn.
HALSTEAD, George Byron—M, Havana, Cuba
HARLEY, Edward J., Jr.—AM, Philadelphia, Pa.
HARTMAN, John Milton—AM, New Kensington, Pa.
HARTMAN, Oscar H.—M, Toledo, Ohio
HARVEY, Theron F.—J, Schenectady, N. Y.
HARVEY, William Dow—J, New York, N. Y.
HEALD, Willard R.—J, Wilmington, Del.
HENDERSON, George A.—M, Dover, N. J.
HENDRICKSON, Fred K.—M, Worcester, Mass.
HENNIG, Walter A.—AM, Buffalo, N. Y.
HENOFER, John P.—M, Charlotte, N. C.
HEROD, William Rogers—J, Schenectady, N. Y.
HEUSER, Charles J.—M, Passaic, N. J.
HILLEARY, Warren—AM, New York, N. Y.
HINGER, A. William—M, Philadelphia, Pa.
HIRSCH, Robert R.—J, Philadelphia, Pa.
HISS, George Crosby—J, New York, N. Y.
HITCHCOCK, James E.—J, New Haven, Conn.
HOERNER, Joseph F.—J, New York, N. Y.
HORN, James M.—J, Hoboken, N. J.
HOUCK, Walter V.—A, Snyder, N. Y.
HOUSTON, Paul L.—J, Washington, D. C.
HOWARD, Thornton W.—AM, Schenectady, N. Y.
HUME, Arthur P.—M, Ambridge, Pa.

IRISH, William, W.—M, Bloomfield, N. J.

JACKSON, J. J.—J, Newark, N. J.
JACOBSON, Henry—M, Milwaukee, Wis.
JEHU, Walter I.—M, Chicago, Ill.
JENNINGS, Theodore W.—M, Boston, Mass.
JENSEN, Martin—J, Passaic, N. J.
JOHNSON, Charles H.—M, Kearney, N. J.
JOHNSTON, Arthur C.—M, Chicago, Ill.
JONES, Isaac H.—M, Philadelphia, Pa.
JONES, John G.—M, Rochester, N. Y.
JOY, Warren W.—J, Marshalltown, Iowa
JUNGHANNS, Ernest L.—M, Anaconda, Mont.

KELLEY, W. Morton—AM, New York, N. Y.
KELLOGG, R. H.—J, Ivorydale, Ohio
KELTING, Clarence A.—J, New York, N. Y.
KEMP, Harold Augustus—J, Buffalo, N. Y.
KENNEDY, Frank J.—AM, Ambridge, Pa.
KERR, John A.—AM, Kitchener, Ont., Canada
KILLE, Gildon E.—AM, Philadelphia, Pa.
KLEIN, Sidney—J, Salt Lake City, Utah
KOLB, William K.—AM, Kapuskasing, Ont., Canada
KNUDSON, Louis R.—J, Orange, N. Y.

LAMB, Harold—M, Lowell, Mass.
LAMBERT, Carl F.—M, Kansas City, Mo.
LAROS, Gerald—J, Cincinnati, Ohio
LAROSCH, John P.—AM, Edge Moore, Del.
LEDERER, E. R.—M, New York, N. Y.
LINDFORS, Viking—AM, Detroit, Mich.
LINDHOLM, John I.—AM, Bridgeport, Conn.
LO, Ying C.—J, Tangshan, North China
LOUGHRAU, John J.—J, Brooklyn, N. Y.
LUM, Samuel C., Jr.—A, Orlanda, Fla.
LUPFER, Theophilus M. R.—AM, Detroit, Mich.
LYONS, Daniel A.—J, Honolulu, T. H.

McAUSLAND, Alfred H.—J, Cleveland, Ohio
McCABE, Charles John—J, Detroit, Mich.
McCONNELL, Edward B.—M, New York, N. Y.
McDONALD, W. A.—M, Houston, Tex.
McINTYRE, James—AM, Abington, Mass.
McKIBBEN, Frank Pape—M, Schenectady, N. Y.
McQUOWN, Leonard A.—J, Southbridge, Mass.
McWORKMAN, Delamar—AM, Indianapolis, Ind.
MAHONY, Ralph Gerard—J, Chicago, Ill.
MARKTHALER, Leo V.—J, Elmira, N. Y.
MARSH, Arthur B.—AM, Bridgeport, Conn.
MAYHEW, Benj. Alan—J, Long Island City, L. I., N. Y.
MEADE, Ray—J, Ensley, Ala.
MEINECKE, Paul F.—J, Corona, L. I., N. Y.
MERENESS, Kneeland—J, Ithaca, N. Y.
MERRILL, Joseph L.—M, Philadelphia, Pa.
METCALF, Lester G.—AM, Oleum, Cal.
MILNER, Cobb—J, Atlanta, Ga.
MOIR, Robert B.—AM, Chicago, Ill.
MOULTON, Robert S.—J, Boston, Mass.
MUIR, James F.—M, St. Paul, Minn.
MULLAN, J. J.—M, New York, N. Y.
MURRAY, Robert H.—M, Hopewell, Va.

NEESON, M. F.—AM, Birmingham, Ala.
NOLAND, Roscoe C.—J, Bremerton, Wash.
NORVELL, Lorenzo—AM, St. Louis, Mo.

O'NEIL, Charles B.—J, St. Louis, Mo.
ORR, Fred L.—J, Houston, Tex.

PARTRIDGE, M. E.—J, Akron, Ohio
PATERSON, Wm. B.—J, Toronto, Ont., Canada
PETERSON, Adolph—M, New York, N. Y.
PETERSON, Amos G.—AM, Buffalo, N. Y.
PHELPS, Merrick W.—J, Syracuse, N. Y.
PHILLIPS, Daniel W.—M, St. Louis, Mo.
PLACE, Louis V., Jr.—J, New York, N. Y.
POHLMAN, Adolph—AM, Long Island City, L. I., N. Y.
POMEROY, Ralph E. H.—M, Canton, Ohio
PORTER, Harry W.—AM, New York, N. Y.
POTTER, Daniel F.—M, Buffalo, N. Y.

REICHENBACH, Harry A.—M, Allentown, Pa.
REID, W. M.—J, State College, Pa.
RENTON, William R.—M, Winchester, Mass.

RENTSCHLER, John P.—AM, Hastings, Mich.
RICE, Howard C.—M, Buffalo, N. Y.
RICHMOND, Kenneth Calvin—J, New York, N. Y.
ROBERTS, Frank Calvin, Jr.—J, Philadelphia, Pa.
ROE, Walter H.—M, Tiffin, Ohio
ROWLETT, Richard S.—J, Worcester, Mass.
RUFF, Herbert—AM, Camden, N. J.
St CLAIR, Clinton D.—J, Akron, Ohio
SAMANS, Walter—M, Philadelphia, Pa.
SCHELLING, Robert Frederick—J, Buffalo, N. Y.
SCHWEIZER, Charles L.—J, New York, N. Y.
SEARS, Harold T.—J, Pueblo, Colo.
SEGUR, Asa B.—AM, Chicago, Ill.
SHANNON, Jean R.—AM, Milwaukee, Wis.
SIMMS, Fred Berry LaRue—M, Tracy, Cal.
SMITH, Albert T.—AM, Boston, Mass.
SMITH, Archie—AM, Woodward, Ala.
SMITH, Harold C.—A, Chicago, Ill.
SMITH, Hugh—AM, Watervliet, N. Y.
SMITH, Walter—M, Philadelphia, Pa.
SNIFFEN, William H.—AM, Hartford, Conn.
SPARR, Arthur H.—AM, Passaic, N. J.
SPELLER, Frank N.—M, Pittsburgh, Pa.
SPENCER, Albert W.—AM, New York, N. Y.
STAHL, David Vinton—AM, Philadelphia, Pa.
STANWICK, Chas. A.—AM, New York, N. Y.
STAPLES, John A.—J, Plainfield, N. J.
STAUVERMAN, Edward—A, Birmingham, Ala.
STINSON, T. W.—AM, Newark, N. J.
STOTT, James M.—AM, Bloomfield, N. J.
STRACHAN, John—M, New York, N. Y.
STREZYNSKI, Geo. Julius—J, New York, N. Y.
SUNDAY, John Layton—J, Philadelphia, Pa.
SUTTON, Russell T.—AM, Detroit, Mich.
SWANTON, Allen F.—J, New York, N. Y.
SWENSON, Frank J.—AM, New York, N. Y.
SWIFT, Paul F.—J, Dayton, Ohio
SWIGERT, William K.—M, Indianapolis, Ind.
THIES, William H.—J, Wilmington, Del.
THOMPSON, Louis Neil—J, Essington, Pa.
TOPPIN, W. R.—A, Chicago, Ill.
TROST, Paul A.—M, New York, N. Y.
VAN TINE, Charles H.—M, Toledo, Ohio
VOYSEY, Alfred—AM, Trenton, N. J.
WAGNER, Ernest E.—J, Chicago, Ill.
WALKER, Charles A., Jr.—M, Watervliet, N. Y.
WALL, William C.—AM, New Britain, Conn.
WALTHER, Paul H.—M, New York, N. Y.
WARD, Wm. H.—M, Chicago, Ill.
WARNER, John E. A.—AM, Cape Madeleine, Que., Canada
WARWICK, John Withrow—J, Beaver Falls, Pa.
WATSON, C. Roy—AM, Columbus, Ohio
WEAVER, Hal C.—M, Austin, Tex.
WEED, Irving—M, Brooklyn, N. Y.
WELCH, Albert E.—AM, New York, N. Y.
WELLER, Geo. L.—M, Blasdell, N. Y.
WHITE, Byron E.—M, Utica, N. Y.
WHITE, Raymond E.—M, Chicago, Ill.
WIBON, Eric H.—J, Bayonne, N. J.
WIER, John B., Jr.—M, New Orleans, La.
WILKES, Frederick C. D.—M, Watertown, Wis.
WILSON, John E.—M, Chicago, Ill.
WITMER, Geo. S.—AM, Lima, Peru, S. A.
YOUNG, Arthur—J, Brooklyn, N. Y.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER DEC. 13, 1920

BELOW is a list of candidates who have filed applications since the date of the last issue of Mechanical Engineering. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 250.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by Dec. 13, 1920, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

California

CURL, William, T. W., Sales Engineer, Valvoline Oil Co., Los Angeles
MALEEV, Vladimir L., Designer of Oil Engines, Western Machinery Co., Los Angeles
REMNITZ, Albert W., Sales Engineer, Llewellyn Iron Works, Los Angeles

Connecticut

ALLEN, Ralph, Factory Manager, Acme Tool & Machine Co., Derby
BALDAUF, Willard W., Chief Draftsman, Stamford Rolling Mills, Springdale
BARRETT, Alfred L., Contract Agent in New York City, The Greist Manufacturing Co., New Haven
BLOCH, Moses, Designer, Yale & Towne Manufacturing Co., Hartford
BRONSON, George E., Assistant to Mechanical Engineer, American Brass Co., Beacon Falls
CHURCH, Lloyd M., Sales Manager, The Automatic Refrigerating Co., Hartford
GEPHART, Henry O., Master Engineer, Winchester Repeating Arms Co., New Haven
JONES, Wesley T., Assistant to Engineer of Tests, N.Y.N.H & H.R.R., New Haven
MALBY, Seth G., General Manager, Ansonia Manufacturing Co., Ansonia
NERO, George H., Auditor Freight Receipts, New York, New Haven & Hartford Railroad Co., New Haven
ROGERS, James J., Production Engineer, Connecticut Telephone & Electric Co., Meriden
ROSE, Henry E., Master Mechanic, Stamford Rolling Mills Co., Springdale
SKINNER, Sherrod E., Mechanical Engineer, Lauders Frary & Clark, New Britain
SMITH, Theall F., Stamford Rolling Mills Co., Springdale
WILLIAMS, Stephen L., Designer, Pratt & Whitney Co., Hartford

Delaware

JOHNSON, Wills, Head of Design Division, Engineering Department, duPont Co., Wilmington
SEGEL, Joseph, Power Test Engineer, E. I. duPont de Nemours & Co., Wilmington

District of Columbia

BLACK, Archibald, Partner, A. & D. R. Black, Washington
WISSOTSKY, Eugene E., Member of former Artillery Commission to U.S.A., Attached to Staff of Russian Embassy, Washington

Georgia

COOPER, Frank H., Fulton Bag & Cotton Mills, Atlanta
DAVIDSON, Joseph, Chief Engineer of General Superintendent, American Machine & Manufacturing Co., Atlanta
GENZ, Henry E., Assistant Professor of Mechanics, Georgia School of Technology, Atlanta
KAPP, Cecil A., Associate Professor of Coordination, Georgia School of Technology, Atlanta
KENT, Laurence F., Heating Engineer, Charles Heer, Atlanta
McCUTCHEN, Roy M., Captain, Corps of Engineers, United States Army, Camp Benning
MACINTYRE, Alexander F., Agent, Fulton Bag & Cotton Mills, Atlanta
NOLAND, Sollie C., Department Manager, Automatic Sprinkler Co. of America, Atlanta

Illinois

BLEAU, Arthur A., Assistant Engineer, Sanitary District of Chicago, Chicago
BROOKE, Irving E., Mechanical Engineer, Lockwood Greene & Co., Chicago
CRYTSER, Charles A., Chief Engineer, Aurora Elgin & Chicago R.R. Co., Aurora
MATHER, Archie J., Assistant Works Manager, Walworth Manufacturing Co., Kewanee
MAUPIN, Oval A., Staff Assistant to General Manager, Union Special Machine Co., Chicago
NASH, Howard B., Chief Engineer, Armour Leather Co., Chicago
SJOBERG, Sidney T., Chief Engineer, Whiting Foundry Equipment Co., Harvey
TIGWELL, Percy H., Ingersoll Milling Machine Co., Rockford
YOUNG, Lewis L., L. V. Estes, Inc. Chicago

Indiana

BUSHNELL, Clifford D., Superintendent of Buildings, Purdue University, W. LaFayette
CARR, Walter deL., Superintendent, Northern Indiana Gas & Electric Co., Hammond
NEAL, George A., Manager, Northern Indiana Gas & Electric Co., Michigan City
WEYL, Pierce A., Engine Assembler, Anderson Foundry & Machine Co., Anderson

Kansas

TAIT, Ralph S., Assistant Professor, University of Kansas, Lawrence

Maryland

GILL, Charles A., Superintendent Motive Power, Baltimore & Ohio Railroad Co., Baltimore
GOTTLIEB, William, Ottemheimer Bros., Baltimore
PRICE, Floyd U., Sales Engineer, Sun Oil Co., Baltimore

Massachusetts

ALHEIM, John L., Public Accountant & Cost Engineer, Cooley & Marvin Co., Boston
COUPLAND, Richard C., First Lieutenant, U.S. Army, Boston
DAVIS, Alfred S., Engineer, Stone & Webster, Inc., Boston
DENNIS, Wolcott, Instructor, Harvard University, Cambridge
FALES, Herbert G., Instructor, Massachusetts Institute of Technology, Cambridge
FLINCHBAUGH, Donald F., Chief Draftsman, New England Confectionery Co., Boston
FRASER, Warren F., President & Engineer, Warren F. Fraser Co., Westboro
LA CROSSE, Emmett, Engineer, Industrial Division, Stone & Webster, Inc., Newton
MACCULLOUGH, Gleason H., Instructor in Mechanical Engineering, Worcester Polytechnic Institute, Worcester
MITRA, Dhirendra N., Engineer, General Electric Co., West Lynn
MORAN, John W., Superintendent & Chief Engineer, Fall River Water Department, Fall River
TOWER, C. Lothrop, The Babcock & Wilcox Co., Boston
WELLINGTON, C. Oliver, Partner, Scovell, Wellington & Co., Boston

Michigan

ALVARADO, Salvador E., Special Machine Designer, Tractor Division, Ford Motor Co., Dearborn
FAGG, George E., Oakland Motor Car Co., Pontiac

MASON, WENDELL E., Teaching Assistant, Mechanical Engineering, University of Michigan Ann Arbor
NEFF, EARL C., Maintenance Engineer, Oak Planing Mill, Royal Oak
PATTISON, GEORGE B., Power Plant Engineer, Smith, Hinchman & Grylls, Detroit
PRIMEAU, BRUNO C., Assistant to Assistant Superintendent, Union Carbide Co., Sault Ste Marie

Missouri

BRETZFELDER, MORRIE F., District Manager, Alvey Manufacturing Co., St. Louis

New Jersey

BEKKER, JOHN A., General Superintendent, Falstrom Co., Passaic
BOHN, HERBERT C., Instructor, Department of Mechanical Engineering, Stevens Institute of Technology Hoboken
DANIEL, CHARLES M., Rutherford
DAVIS, VERNER F., Vice-President & General Manager, Atlas Valve Co., Newark
EMMONS, EDWARD N., Rate Engineer, Hyatt Bearing Division, General Motors Corp., Harrison
FARRELL, THOMAS A., Rate Engineer, Hyatt Bearings Division, General Motors Corp., Newark
HALL, LEO G., Engineer, Construction Department, Willys Corp., Elizabeth
HARPER, WILLIAM S., Director of Production, Oxweld Acetylene Co., Newark
HAZEN, SILAS A., Time Study Engineer, Klaxon Co., Newark
HUTTON, ROBERT G., Manager, Wilson Welding Repair Co., Jersey City
LUPTON, EDGAR B., Chief Engineer, Montclair Water Co., Little Falls
MURPHY, RALPH W. P., Contract Analyzer, Babcock & Wilcox Co., Bayonne
NUGEY, ANTHONY L., Designer & Checker, International Coal Products Corp., Newark
ROGERS, FRANCIS C., President & General Manager, John M. Rogers Works, Gloucester City
RONAY, BELA, Chief Draftsman & Assistant to Chief Engineer, Metal Thermit Corp., Jersey City
ROOT, WARREN S., Chief Draftsman, Bethlehem Shipbuilding Corp., Moore Plant, Elizabeth
SMITH, HAROLD E., Sales Engineer, Wilson Welding Repair Co., Jersey City
THOMSEN, WILLIAM A. V., Niles-Bement-Pond Co., Plainfield
VOGEL, WILLIAM J., Checker, Babcock & Wilcox Co., Bayonne
VOGELBACH, OSCAR, Hyatt Bearings Division, General Motors Corpn., Harrison

New York

ABRAHAMSON, HOWARD B., 1st Assistant Engineer, S. S. Lake Farber, United States Shipping Board, New York
ALLEN, HOWARD L., Mechanical Designer, Fuller Industrial Engineering Corpn., New York
ANDERSON, CHARLES E., Engineer, Thomas E. Murray, Inc., New York
ANDREW, FREDERICK W., Chief Engineer, Eisemann Magneto Corp., Brooklyn
AUGUR, ROBERT C., Associate Editor, Material Handling Cyclopedia, Simmons-Boardman Publishing Co., New York
BARR, SAMUEL D., Barr Radiator & Manufacturing Co., Inc., Brooklyn
BATTU, L. P. LEONCE, President, Rateau Battu Smoot Engineering Corpn., New York
BAUMAN, EDWARD, Werner Nygren, New York
BEGLEY, RICHARD W., Assistant Superintendent Engineer, Booth American Shipping Corpn., New York
BEHR, HENRY C. A., In charge of Experimental & Construction Work of Dried Milk Machinery, The Borden Co., New York
BERTELSEN, VALDEMAR, Mechanical Engineer, Otis Elevator, Co., New York
BRADLEY, ALEXANDER, Power Specialty Co., New York
BRENDLIN, HERMAN J., Assistant Chief Engineer, The Hayward Co., New York
BRODY, ISAAC, Draftsman, Standard Conveyor Co., New York
BUCHERT, HARRY, Combustion Engineer & Vice President, Furnace Engineering Co., New York
CALLAGHAN, JOSEPH F., Industrial Engineer, American Ever Ready Works, Long Island City
CARTER, WILMER H., Sales Engineer, Allied Machinery Co. of America New York
CONDIT, KENNETH H., Managing Editor, American Machinist, New York
DIERCKX, JULES, Vice President & Sales Manager, Keller Mechanical Engineering Co., Brooklyn
DUCKWORTH, RICHARD H., Tool Designer, Service Engineering Co., Brooklyn
ENTENMANN, WERNER O., Assistant Mechanical Engineer, The New York Steam Co., New York
FITZGERALD, HARRISON W., Chief Engineer, Donner Steel Co., Buffalo
GEDDES, CHARLES I., Chief Designing Engineer, Woold Instrument Corp., New York
GEE, WALTER S., Member of Firm, Lybrand, Ross Brothers & Montgomery, New York
GORBEA, MANUEL I., Estimator, United States & Cuban Allied Works Engineering Corpn., New York
GOTO, KANEZO, Engineer Captain of Japanese Navy, New York
GRAHAM, HUGH U., Directing Engineering Work, Rome Wire Co. Rome
GRETHER, EDWARD C., Equipment Engineer, American Sugar Refining Co., New York
GRUTZNER, FRITZ P. De La Vergne Machine Co. New York
HAYWARD, RALPH A., Engineer, The R. B. Wolf Co., New York
HORNER, EDWIN F., Superintendent of Mechanical & Maintenance Engineering Department, American Druggist Syndicate, Long Island City
HORNER, OLIVER A., Commercial Engineer, General Electric Co. New York
HOWES, THOMAS S., Superintendent, Engineer, France & Canada Steamship Corpn., New York
JACKMAN, HYMAN, Patent Draftsman, H. Jackman, New York
KLEINERT, RALPH B., Partner, L. R. Merritt & Co., New York
KUME, JINTA, Resident Representative, Imperial Government Railways of Japan, New York
LEWIS, BENJAMIN L., Sales Engineer The Jeffrey Manufacturing Co. New York
LIEBREICH, OSCAR P., Board of Education, Heating & Ventilating Division, New York
LINCOLN, WILLIS C., Engineer, National Railway Appliance Co., New York
McDONALD, WILLIAM H., Chief Engineer, The United Electric Light & Power Co., New York
McGINN, EDWARD J., Chief of Tool & Special Machine Design, De La Vergne Machine Co., New York
McWILLIAMS, JAMES E., Mechanical Draftsman, Department of Plant & Structures, City of New York, St. George, S. I.
MERRITT, LUCIUS R., Partner, L. R. Merritt & Co., New York
METTEN, IRVING H., Superintendent Engineer, Norton Lilly Co., New York
MONTALVO, WILLIAM W., Jr., Engineer, F. E. Idell, New York
NAWRAT, STEPHEN J., Draftsman, American Hard Rubber Co., New York
OLLER, RICHARD H., Assistant to Oriental Manager, Allied Machinery Co. of America, New York
OLSEN, WILLIAM, Designing Draftsman, Charles E. Murray, Engineers, Brooklyn
PARKER, JOHN, Eastern Manager, Milwaukee Electric Crane & Manufacturing Co., New York
PEYSER, HAROLD, Principal of Pre-vocational School No. 95, New York
RIDINGS, WALTER A., President & General Manager, The Porter Cable Machine Co., Syracuse
SCHAEFER, EDWARD E., Sales Engineer, A. S. Cameron Steam Pumps Works, New York
SCHRADER, LLOYD F., Designing Engineer, Foundation Oven Corp., New York
SCHROEDER, FRED A., Mechanical Engineer, Raymond Concrete Co., New York
SCOTT, RUMSEY W., Manager Industrial Department, Chemical National Bank, New York
SERENA, MICHAEL F., Mechanical Draftsman, Service Engine Co., Brooklyn
SIEGEL, DAVID T., Sales Engineer, Siegel Tool Supply Co., New York
SMARLING, CARL A., 2nd Assistant Chief Tool Designer, Service Engineering Co., New York
SMITH, EDWIN R., General Manager, The Seneca Falls Manufacturing Co., Inc., Seneca Falls
SMITH, HALFOAN, Time Study & Rate Setting Supervisor, Library Bureau, Ilion
STECHER, LEWIS J., Post Graduate Work, Columbia University, New York
STOELZER, WALTER H., Designer & Checker, Dwight P. Robinson & Co., Inc., New York
VAN BUSKIRK, GEORGE L., Inspector, Motive Power Department, Interborough Rapid Transit Co., New York
WALLACE, JAMES H., Assistant Mechanical Engineer, Department of Plant and Structures City of New York, St. George, S. I.
WELLS, EDWARD H., Chairman of the Board of Directors, The Babcock & Wilcox Co., New York
WHITEFORD, ALEXANDER W., Sales Engineer, The Oxweld Railroad Service Co., New York
WILLOUGHBY, VICTOR R., Assistant General Mechanical Engineer, American Car & Foundry Co., New York
WORTH, HAROLD H., Draftsman, New York Edison Co., New York
WUNDERLICH, OSKAR, Chief Engineer, Porter-Cable Machine Co., Syracuse

North Carolina

FOSTER, JOHN M., Assistant Professor, North Carolina State College of Agriculture and Engineering, West Raleigh
WORTH, DANIEL B., Instructor, North Carolina State College of Agriculture and Engineering, West Raleigh

Ohio

BUCHER, PAUL, Instructor in Mechanical Engineering, Ohio State University, Columbus
CASEY, ALBERT A., Head of Record Department, Cleveland Electric Illuminating Co., Cleveland
COOK, ROBERT G., Planning Engineer, Warner & Swasey Co., Cleveland
FRANCIS, TENCH, Student Sales Engineer, Worthington Pump & Machinery Corpn., Cincinnati
GRIMMER, ERNEST A., Hooven, Owens & Rentschler Co., Hamilton
HUNTER, RONALD E., Assistant, Department of Mechanical Engineering, Ohio State University, Columbus
MALONE, CHARLES J., Instrutor, Training Course, American Steel & Wire Co., Cleveland
MAYER, CARL F., Mechanical Engineer, Ohio Body & Blower Co., Cleveland
PLATZ, EDWARD H., JR., Sales Engineer, The Duriron Co., Inc., Dayton
STEWART, BURNS A., General Superintendent and Assistant to Director of Manufacturing, The National Supply Co., Toledo
WINCHEL, GEORGE C., Mechanical Engineer, The Woodard Machine Co., Wooster

Oklahoma

BAKER, WILLIAM W., Construction Superintendent, Sinclair Oil & Gas Co., Tulsa
FREEBORN, FAUN W., President, F. W. Freeborn Engineering Corpn., Tulsa

THOMAS, Rosswell W., Construction Foreman, Chestnut & Smith Corpn., Tulsa

Oregon

BODWELL, Clarence P., Captain, Coast Artillery Corps, Fort Stevens

Pennsylvania

BARTEN, Edward A., Draftsman, Meigs, Bassett & Slaughter, Philadelphia
BASSETT, Burdett E., Aluminum Company of America, Pittsburgh
BELLIS, William C., Draftsman, Midvale Steel & Ordnance Co., Nicetown Works, Philadelphia
BLAKESLEE, Doraf W., Electrical Engineer, Jones & Laughlin Steel Co., Pittsburgh
CONLON, William T., Test Engineer, American Engineering Co., Philadelphia
CUSTER, Granville Y., Production Engineer, Parish Manufacturing Co., Reading
DERIVAUX, Joseph, Assistant Power Plant Engineer, Oil Well Supply Co., Oil City
DUNN, Roland I., Westinghouse Electric and Machine Co., South Philadelphia
ENGSTROM, Thor, Designer, American Steel & Wire Co., Pittsburgh
FISH, Roger E., Sales Engineer, Erie Forge Co., Erie
FOX, Winters B., Foreman of Maintenance, Fayette R. Plumb, Inc., Frankford
HARMAN, George F., Special Machine and Tool Designer, United States Gauge Co., Sellersville
KELSO, Erle R., Engineer in charge Mechanical Construction, National Tube Co., Ellwood City
McLOUGHERY, Charles, Consulting and Designing Engineer, Sun Co., Philadelphia
MORRIS, Edward H., 2nd, Assistant Engineer, John Lang Paper Co., Philadelphia
NAGLE, Raymond J., Master Mechanic, Sauquoit Silk Manufacturing Co., Scranton
PARKES, George H., Instructor of Trade Drawing, Williamsport Industrial School, Williamsport
PORTER, Wallace B., Assistant Engineer Motive Power, Pennsylvania System, Williamsport
SEARS, Edward A., Technical Assistant, U.S.S.B., Hog Island
WALDO, Hollis T., Sales Engineer, Goulds Manufacturing Co., Philadelphia

Rhode Island

ARNOLD, Roy F., B. B. & R. Knight, Inc., River Point
GOLDTHWAIT, Joel A., Assistant Engineer, United States Finishing Co., Providence

Tennessee

KENNEDY, Verner A., Assistant Superintendent, Lucy Manufacturing Co., Plant-2, Chattanooga

Texas

BLANDFORD, John B., Jr., Student Engineer, Fuel Efficiency Department, The Texas Co., Port Arthur
ROBERTSON, John M., Efficiency Engineer, Galena Signal Oil Co. of Texas, Houston

Virginia

GOODWIN, Ernest G., Designer, Norfolk & Western Railway Co., Roanoke

Washington

HARRIS, Ernest Nye, Office Engineer, Puget Sound Bridge & Dredging Co., Seattle
KENGLE, Lansford F., Lieutenant, U.S.N., Assistant to Inspector of Machinery, U.S.N., Todd Dry Dock and Construction Corpn., Tacoma
WINSLOW, Arthur M., Assistant Professor of Mechanical Engineering, University of Washington, Seattle

West Virginia

SUTTELLE, Victor Paul, General Sales Manager, Tirometer Valve Corpn., Charleston

Wisconsin

GUEST, Arthur B., Research Engineer, French Battery & Carbon Co., Madison
JOHN, Edward T., Superintendent, Curtis & Yale Co., Wausau
LOYSTER, Carl Earl, Chief Draftsman, Globe Seamless Tubes Co., Milwaukee
ULLMAN, Maurice B., Graduate Apprentice, Allis-Chalmers Manufacturing Co., Milwaukee
WALKER, William J., Assistant Chief Engineer, Menominee Motor Truck Co., Clintonville

Canada

DRAESEK, Alfred W., Chief Draftsman, The John Bertram & Sons Co., Ltd., Dundas, Ont.
KITTREDGE, Bertie L., Designing Engineer, Canadian Electro Products Co., Shawinigan Falls, Quebec
TAYLOR, William D., Combustion Engineer, Riordon Co., Ltd., Hawkesbury, Ont.

China

PHILLIPS, Bertram T., Operating Manager, Andersen, Meyer & Co., Ltd., Shanghai

Phillipine Islands

HEACOCK, Rupert A., Vice-President, Cranston Engineering Co., Manila

South America

LAIRD, George A., General Manager, Guiana Development Co., Dutch & French Guiana

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

New York

VAN GORDER, Winfred H., Factory Manager, Automatic Ticket Selling and Cash Register Co., New York

PROMOTION FROM ASSOCIATE-MEMBER

Alabama

FEAR, Frank G., Draftsman, Tennessee Coal Iron & Railroad Co., Ensley

California

ROBERTSON, Donald M., Mechanical Engineer, The Holt Manufacturing Co., Stockton

Illinois

JACKSON, Elwell R., Assistant Chief Engineer, Rock Island Arsenal, Rock Island

Maryland

BUBAR, Hudson H., Maintenance and Construction Engineer, Mutual Chemical Co. of America, Baltimore

Minnesota

MOYER, Amos F., Motor Engineer, Toro Manufacturing Co., Minneapolis

New York

ARMSTRONG, George S., Consulting Industrial Engineer, The Robeson Cutlery Co., Perry
BROWN, Henry Abbot, Vice-President and Consulting Engineer, A. C. Towne, Inc., Buffalo
COX, James W., Jr., Consulting Textile Engineer, New York
NESTLER, Peter J., Engineer, The M. W. Kellogg Co New York
WINGE, Otto C., Mechanical Engineer, United States and Cuban Allied Works Engineering Corpn., New York

Pennsylvania

BILLINGS, J. Harland, Professor, Mechanical Engineering, Drexel Institute, Philadelphia

Wisconsin

LINDEMANN, Walter C., Chief Engineer and Factory Manager, A. J. Lindemann & Hoverson Co., Milwaukee

South Africa

ROGERS, John D., Technical Representative, Baldwin Locomotive Works, Johannesburg

PROMOTION FROM JUNIOR

Connecticut

HITT, Fred, Chief Inspector, Pratt and Cady Co., Inc., Hartford

Georgia

GIACOMINO, Joseph L., Assistant Industrial Engineer, Fulton Bag and Cotton Mills, Atlanta

Illinois

BARRY, Thomas J., Assistant Chief Engineer, Dayton-Dowd Co., Quincy
HOWARTH, Jacob M., Assistant Chief Engineer, Marshall Field & Co., Chicago
MALCOLMSON, William J., Western Electric Co., Chicago

Maryland

BURRILL, Harold G., Assistant to Superintendent Steam Stations, Consolidated Gas Electric Light & Power Co., Baltimore

Massachusetts

BALDWIN, Alden W., Statistical Assistant to General Sales Manager, Gilbert & Barker Manufacturing Co., Springfield

New Jersey

PURDY, Asa R., Standard Paint Co., Bound Brook

New York

ARNSTEIN, Leonard A., Superintendent, Imperial Metal Manufacturing Corpn., Long Island City
FINCH, Cecil C., Vice-President and Superintendent, The Broadalbin Knitting Co., Broadalbin
GOLDBERG, Monroe S., President, Master Waterproofers, Inc., New York
SOSSONG, Ray A., General Superintendent, Acetylene Plants, Air Reduction Co., New York

Ohio

RANSOHOFF, Nathan, Treasurer and General Manager, The Ideal Concrete Machinery Co., Cincinnati

Oklahoma

BERNARD, Harold B., General Superintendent, Gasoline Department, Sinclair Oil and Gas Co., Tulsa
MILES, Dale S., Chief Draftsman, Empire Gas and Fuel Co., Bartlesville

Pennsylvania

LOEB, Leo, Mechanical Engineer, Day & Zimmermann, Inc., Philadelphia
SNAVELY, A. Bowman, Hershey Chocolate Co., Hershey

Texas

NETHERWOOD, Joseph S., Mechanical Engineer, Southern Pacific Lines, Houston

West Virginia

BADOWSKI, Alfred, Manager, Tirometer Valve Corpn., Charleston

England

WOLTON, John David, Chief Engineer, Office of Ingersoll-Rand Co., London

France

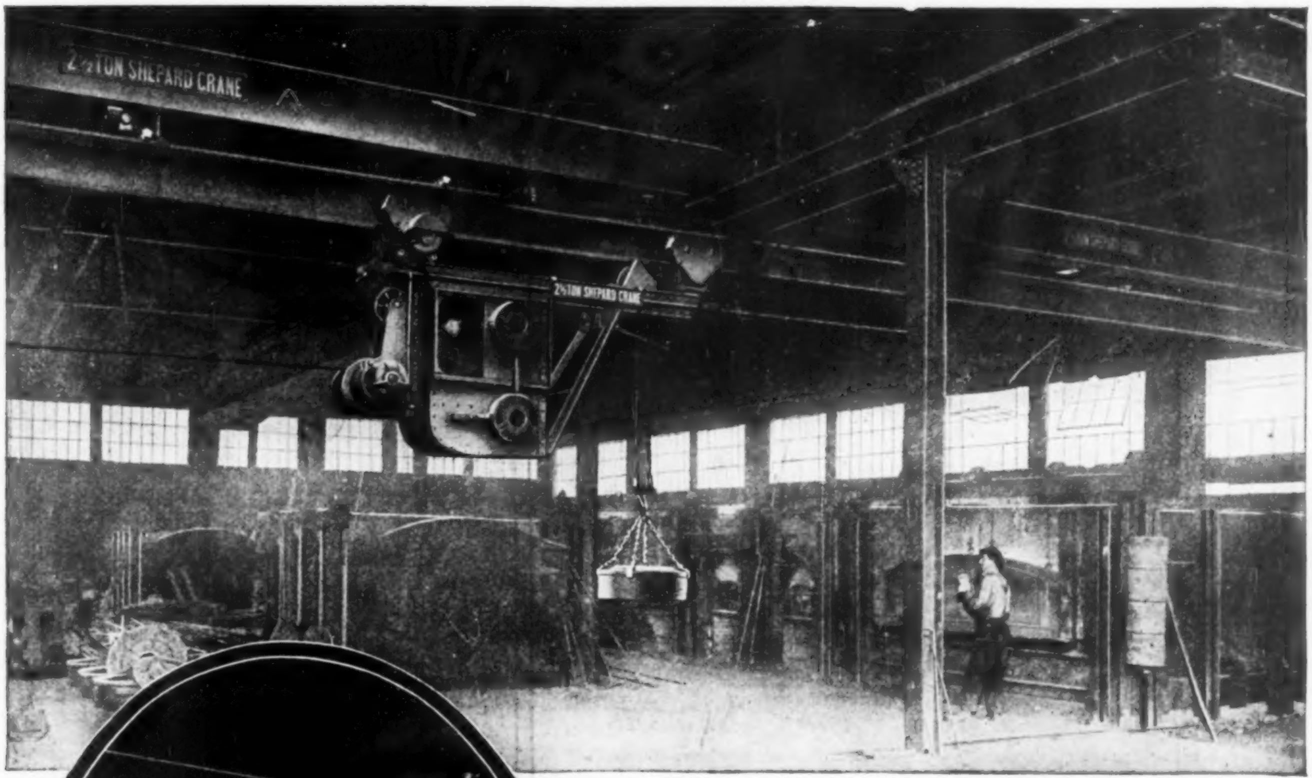
MERRIAM, Carroll F., Paris

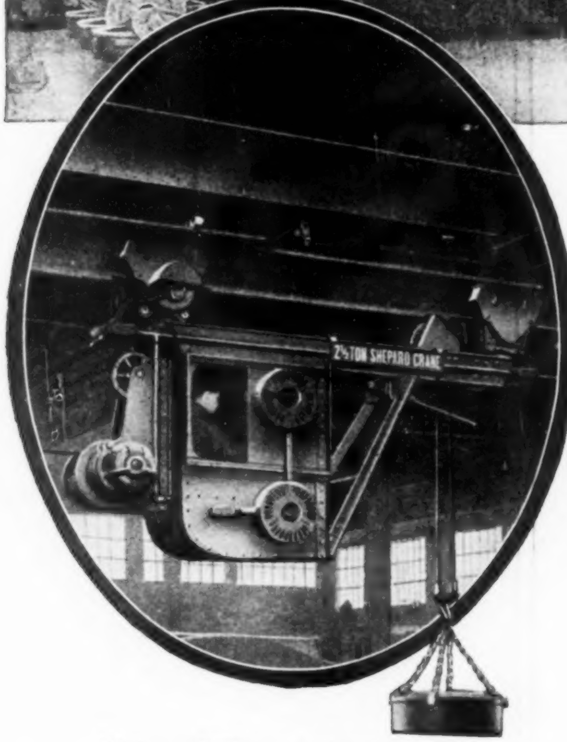
Japan

ISHIMURA, Lyuho S., Engineer, The Nippon Battery Co., Ltd., Kyoto

SUMMARY

New Applications	214
Change of Grading:	
Promotion from Associate	1
Promotion from Associate-Member	13
Promotion from Junior	22
Total	250





Shepard Electric Hoists are made in capacities of 1/2 to 30 tons; Electric Traveling Cranes 1 to 50 tons.

More heats per shift

Greater tonnage per day, because extra heats can be made in the time a "Shepard" saves in charging furnaces.

A Shepard cage-controlled Electric Hoist operating on I-Beam trackage and Transfer Crane will carry a charge from any point in the mill, touched by the system, direct to the furnace. One man, the operator, in the overhead cage, controls the entire operation of lifting, carrying, and lowering.

Mill fumes, dirt, dust, or dampness in no way affect the electrical and mechanical operating mechanisms which are encased in tight metal housings.

Shepard Engineers are competent and willing to assist in laying out the proper system for any foundry. Their services are extended without obligation on your part.

SHEPARD ELECTRIC CRANE & HOIST CO.
370 Schuyler Ave., Montour Falls, N. Y.

New York	Philadelphia	Chicago	Pittsburgh
Boston	Baltimore	Cleveland	San Francisco
Detroit	Melbourne	Montreal	London

Member Electric Hoist Manufacturers' Association 2133-S

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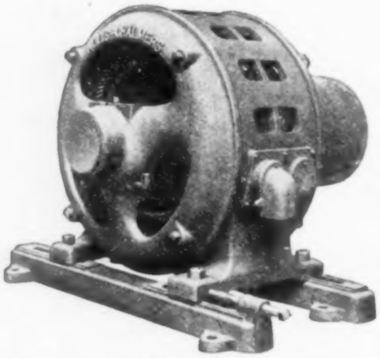
SHEPARD
ELECTRIC CRANES & HOISTS

Alternating Current Motors

Allis-Chalmers Motors



Type "AN" Squirrel Cage Induction Motor

are built in various types designed to meet the characteristics of the driven machine.

Our experience, covering a quarter of a century in the design, building and commercial application of motors of all kinds is at your service.

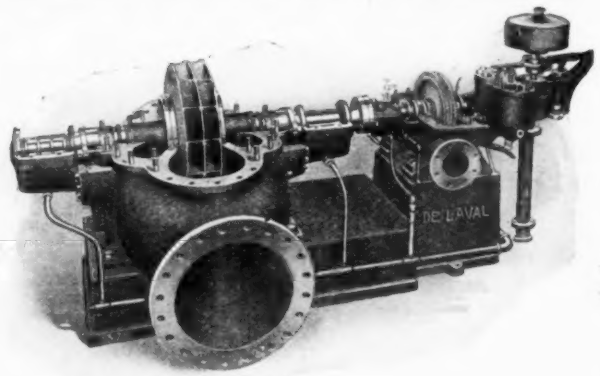
Type "N" Potential Starter for Squirrel Cage Motor

Allis-Chalmers Manufacturing Company

COMPLETE POWER AND ELECTRICAL EQUIPMENT

MILWAUKEE, WISCONSIN

Offices in All Principal Cities



A Modern Centrifugal Blower

The above photograph shows the modern style of centrifugal blower developed by the De Laval Steam Turbine Co. The blower is driven by a directly-connected steam turbine of the impulse type, and is designed to handle 11,000 cu. ft. per minute of air against 33 in. water column when running at 3,600 r.p.m.

All parts, including the blower casing, are heavy and substantial. By removing the casing covers, as shown above, internal parts, that is, the impeller and the turbine rotor, are at once accessible, and can be lifted out after removing bearing caps. Parts subject to wear and corrosion, such as bearings, can be quickly and inexpensively renewed. All parts are built on a limit-gauge, interchangeable basis.

The whole design is directed to securing high efficiency and low steam consumption.

The governing devices are simple and direct, and can be arranged to give constant speed, constant pressure, or constant delivery, as desired.

ASK FOR SPECIAL PUBLICATION F-62

104

DE LAVAL STEAM TURBINE CO.

TRENTON, NEW JERSEY

Low pulse and high fever cost fuel users millions

How much is lost heat from steam lines costing me?

Not long ago fuel users might ask in vain for the answer. Today everyone can know and save fuel through proper insulation correctly applied. Instruments for determining pressures and temperatures; charts and extended calculations are the tools that Johns-Manville Insulation Service is using to answer this very practical business question.

Whether you burn fuel in the house, the factory or the power plant, read what the science of insulation has accomplished.

TWO symptoms always signal heat loss from a steam-pipe. One is lowered pressure in the pipe, the other is high temperature of the air surrounding the bare or poorly insulated pipe.

Now this falling of the pulse and external fever means that fuel in the form of heat is being lost.

It is Insulation's job to minimize this. And so well is this being done by the Johns-Manville Insulation Service that the materials applied are paying for themselves by the heat they save.

This kind of Heat Conservation has become a science.

In past years little was known of the real truths of heat loss. Materials were recommended after inadequate tests; in fact, today if many of the steam pipes covered sometime ago with materials of unknown value were checked up, their covering would be replaced by insulation of known value, and new records for economy set up.

Rising fuel prices make heat losses doubly serious and economy in heat transmission has been realized to be a real factor in cutting heating, power and manufacturing costs.

Changing the physical design of Insulation

An insulation to be of maximum value must have more than the property of preventing heat loss. It must also have physical durability, for a short-life material means early replacement, so that if insulation values are equal, the most durable insulation is the most economical.

If it is desirable to reduce a loss, it is surely advisable to reduce the loss to a minimum. Believing this, Johns-Manville developed physically strong-felted insulations—and with obvious advantages to the fuel user. For these felted insulations are built up in ply form, physically strong and not easily damaged by vibration, handling or rehandling. These improved materials have not only overcome the physical shortcomings of most insulations, but made higher heat efficiencies possible. In fact, on test, one of these insulations has repeatedly been shown to be the most efficient commercial material in existence.

Insulation for every service

No one material should or will serve all practical needs. Steam service where high pressures are used demands different treatment than cold water or brine service. Johns-Manville, in realization of this, offer materials suitable for use indoors and out; overhead and underground and for every type of system, and not only does this service include the furnishing of the materials but their application as well.

The application of an insulation is vital to its performance in service, hence the necessity of controlling this factor if economical results are to be obtained.

Johns-Manville Insulations

Asbesto-Sponge Felted, 85% Magnesia, Asbestocel, Zero, Anti-Sweat and Ammonia Insulation, Underground Conduit Insulation and Insulating Cements.

Efficiencies of
JOHNS-MANVILLE ASBESTO-SPONGE FELTED INSULATION ON 5" PIPE

Thickness in Inches	*Temperature Difference Degrees Fahrenheit* 100°	200°	300°	400°	500°
1"	83.8%	86.1%	88%	89.8%	91.2%
2"	88.6	90.3	91.6	92.8	94.1
3"	91.1	92.5	93.5	94.5	95.4

What Insulation Efficiency Means

90 per cent efficiency,—for instance,—means that the insulation of that efficiency saves 90 per cent of the heat that would be lost if the insulation were not applied.

Example:

One hundred feet of uncovered 5" pipe conveying steam at 150 pounds pressure through a room whose temperature is 70° F. *loses* 1,222,000,000 B. t. u. (units of heat) per year. An insulation 90 per cent efficient *saves* 90 per cent of this loss, or 1,099,800,000 B. t. u. (units of heat).

The equivalents of this *loss* and *saving* in pounds of coal are: LOSS—122,200 lbs., or 61.1 tons coal; SAVING by Insulation—109,980 lbs., or 55 tons coal.

The figures on pounds of coal lost due to uninsulated pipe and saved by use of insulation are based on continuous operation, 24 hours per day, 365 days per year and 10,000 B. t. u. available per pound of coal.

To show the great flexibility of felted insulation, so vital to long life. Nothing to break, crack or powder off as in molded materials.

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Incorporated
Madison Ave. at 41st St., New York City
10 Factories—Branches in 64 Large Cities
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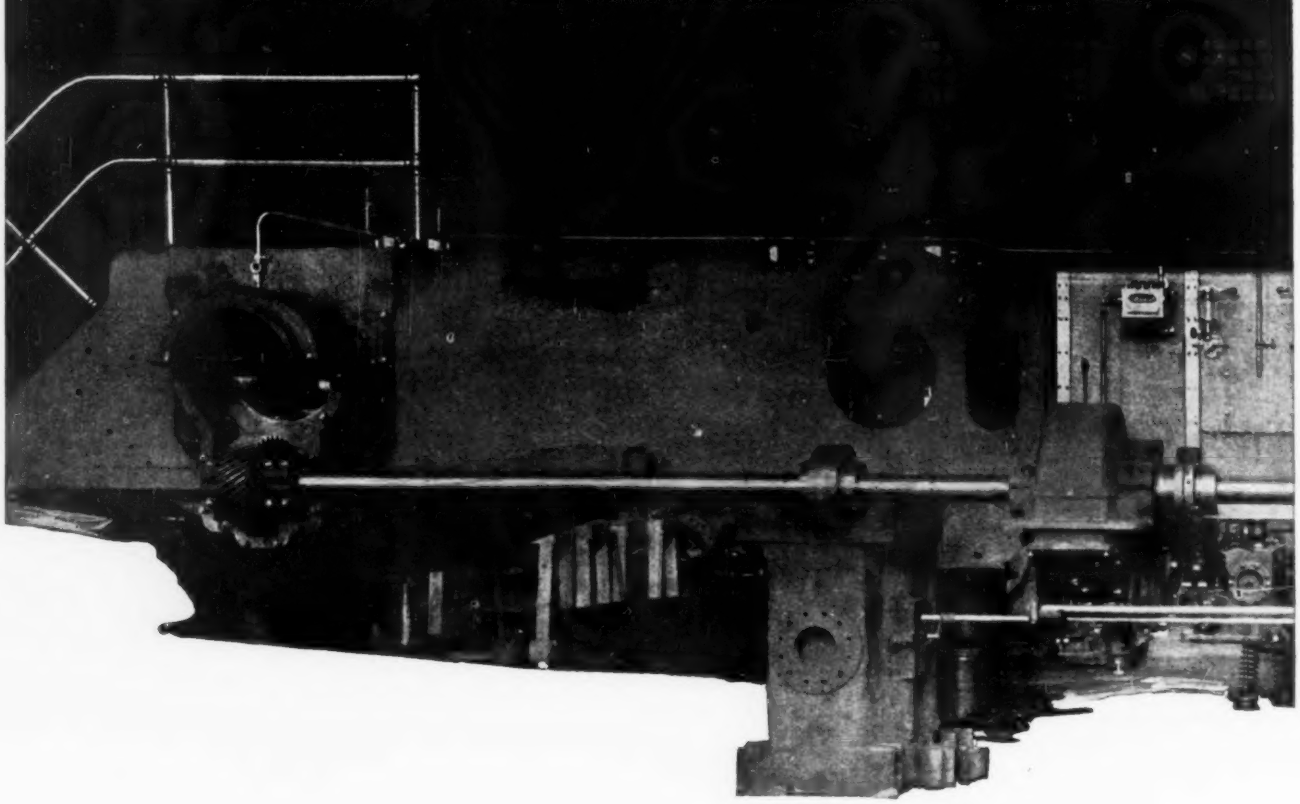
JOHNS MANVILLE SERVICE
COVERS THE CONTINENT

Through—
Asbestos
and its allied products
INSULATION *that keeps the heat where it belongs*
CEMENTS *that make boiler walls leak-proof*
ROOFINGS *that cut down fire risks*
PACKINGS *that save power waste*
LININGS *that make brakes safe*
FIRE PREVENTION PRODUCTS

JOHNS-MANVILLE
Serves in Conservation

HAMILTON

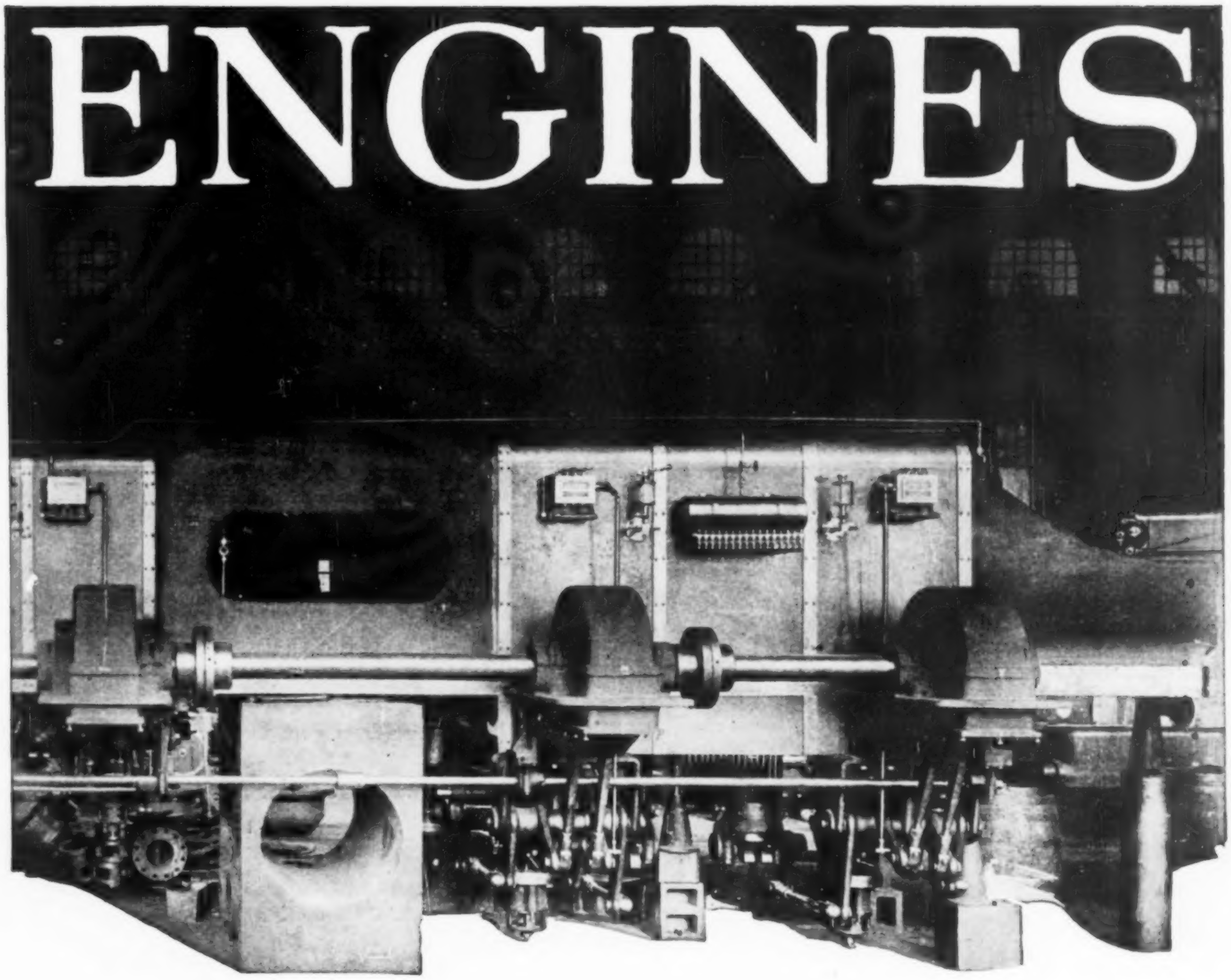


The Ford Motor Company Bought This Engine

The photograph shows the gas unit of a 5400 h. p. gas-steam engine for Henry Ford.

This, with its steam engine twin, is one of nine engines —a power plant of 54,000 h. p. that drives the great Ford Motor Co.'s factory in Detroit.

The immensity of this installation cannot be gauged by the illustration. Neither can we show the quality of every part that went into every engine; nor the brains



and skilled hands of our workmen who made the engines worthy of their great task.

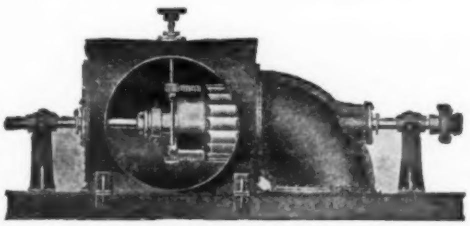
These men, and our entire engineering and executive staff, are ready to put into any work you may have in steam engineering all the experience they have had through many years—and greater than that, the intense loyalty to the job that makes Hamilton Engines good.

Don't hesitate to write our engineering department as if they were your own, free consultants.

THE HOOVEN, OWENS, RENTSCHLER CO.
Hamilton, Ohio

McCormick "Holyoke" Turbine Water Wheel

Write us giving available head of Water, Power and Speed Requirements



Horizontal Turbine

We also Build Headgates

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529 South East Street
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Water Power Equipment

Equipment and Accessories for Water Controlling as required for Canals, Penstocks, Flumes, Irrigation and Sewage Improvements.

Turbine Water Wheels
Flumes and Penstocks
Relief Valves and Gauges
Gates and Valves
Gate Hoists and Floor Stands
Trash Racks and Strainers

Catalog sent on request

RODNEY HUNT MACHINE CO.
97 Mill Street, Orange, Mass.

Manufacturers of Turbine Water Wheels, Water Controlling Apparatus, Power Transmission Equipment, Textile Wet Finishing Machinery, Wood Rolls.

SEE OUR DATA IN 1920 A.S.M.E. CONDENSED CATALOGUES OF MECHANICAL EQUIPMENT

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ONE of the largest collections of engineering literature in the world is that found in the Engineering Societies Library, 29 West 39th Street, New York.

It comprises 115,000 volumes, including many rare and valuable reference works not readily accessible elsewhere. Over 1,100 technical journals and magazines are regularly received, including practically every important engineering journal in the civil, mechanical, electrical, and mining fields.

The library is open from 9 a.m. to 10 p.m., with trained librarians in constant attendance. Its resources are at the service of the engineering and scientific public.

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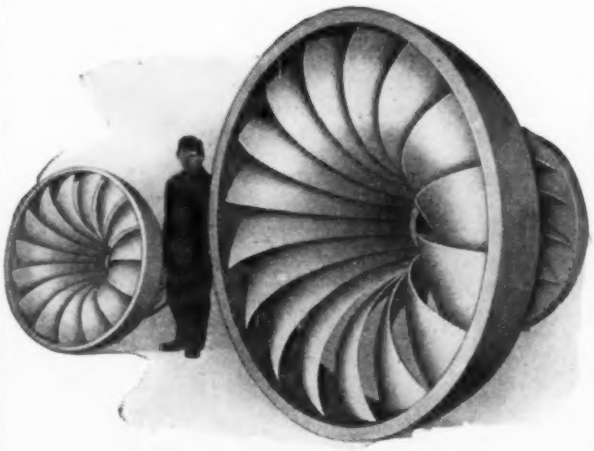
TURBINE WATER WHEELS

HIGH SPEED, HIGH HORSEPOWER
HIGH EFFICIENCIES



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The Largest Cast Steel Runners that Have Ever Been Made in One Solid Casting.

10 Feet Diam.
34,000 Pounds

17,000 H. P.

150 R. P. M.

109 Ft. Head

Four units installed in Holter Plant of Montana Power Co.

S. MORGAN SMITH CO.

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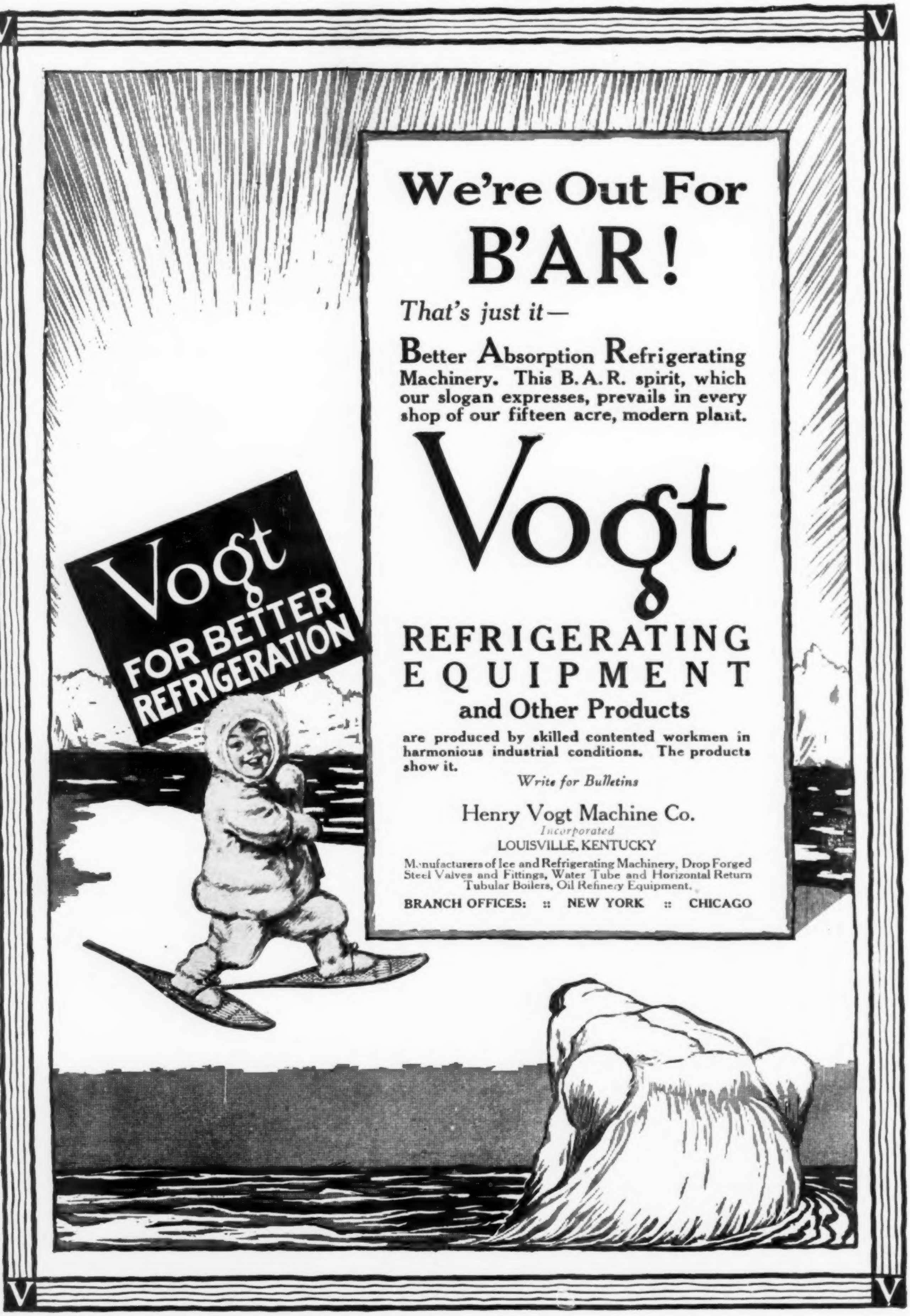
Builders of High Grade Water Power Equipment.

If interested write Dept. "R" for Bulletin of Designs.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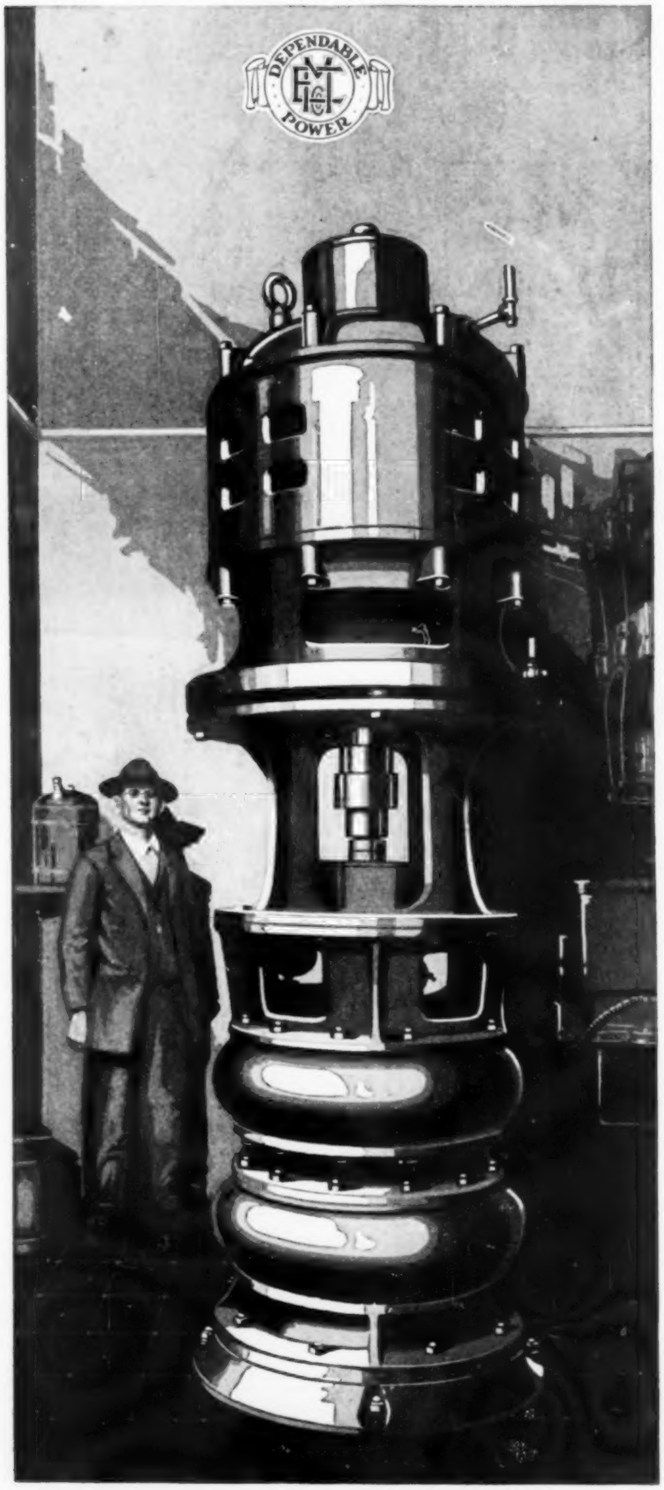

How Many of Your Pumping Units Are Giving Perfect Satisfaction?

Mr. Watson, Superintendent of the Light and Water Department for the City of Owensboro, Ky., writes in part, relative to Midwest Deep Well pumping equipment:

> "We purchased from the Midwest Engine Company in June, 1918, one ten inch Combination Centrifugal Axial pump which we installed at that date, and it has been run *continuously* ever since, a period of twenty-six months, *without ever having stopped*, or costing us one cent for repairs, and it shows no loss of efficiency. To say that we are pleased with it is expressing it mildly."

This pump delivers 1,500,000 gallons per twenty-four hours into the city mains and requires practically no attention.

Let Midwest solve your pumping problems in the same satisfactory manner.

Address—Midwest Engine Co., in the following cities:

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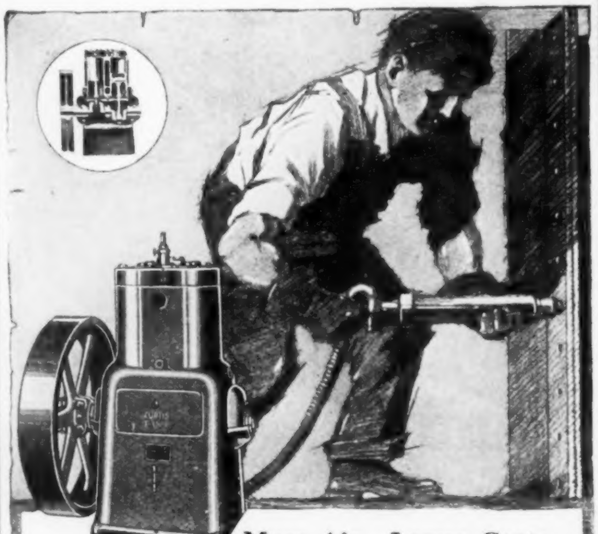
Dependable Power



More Air—Lower Costs

Curtis Air Compressors are built for service and economy. Have 80% more cooling surface than double-acting compressors of same capacity—controlled splash oiling system with regulatable sight feed. Dust- and dirt-proof. 15′ to 300′ capacity. Descriptive literature sent on request.

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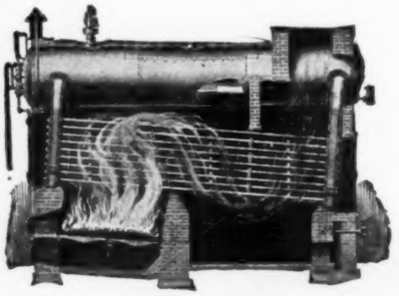
WATER TUBE CROSS DRUM WATER TUBE RETURN TUBULAR

KEELER BOILERS

In Keeler Water Tube Boilers will be found an unusually complete combination of features which increase their efficiency. Keeler Boilers are simple in design and durable in construction. They are absolutely safe as well as economical.



All tubes are straight in Keeler Boilers. This is one of the many outstanding features. Tubes used are standard and carried in stock by dealers everywhere.

There are many other advantages
—let us give you facts and figures
—send for our latest catalog.

E. KEELER COMPANY, Williamsport, Pa.
Established 1864
Branches: New York, Philadelphia, Boston, Pittsburgh.

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CORLISS ENGINES

Corliss Engines are our specialty. Now is the time to make your CORLISS ENGINE replacements for economical conditions to meet present day competition

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Our Modern Well-equipped Shops are prepared to handle general machine work. Large and small tools at your service.

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Green Sand-Dry Sand and Loam Castings up to 40 tons in weight.

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Standard size Scotch Boilers as well as anything in Steel Plate where up-to-date shops and equipment are essential.

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HEINE WATER TUBE BOILERS

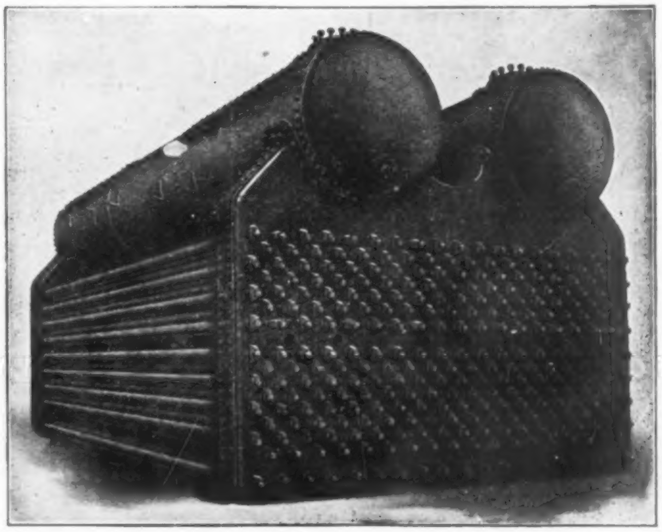
For High Overload Capacities

A boiler should not only have sufficient capacity to meet the normal demand, but also enough overload capacity for all emergencies.

The Heine Boiler is designed for high capacity. It can maintain continuously a rating up to 50 per cent overload, and for peak load conditions a rating from 200 to 300 per cent overloads. This has been demonstrated by numerous tests under actual operating conditions.

For further information, read pages 51 to 55 inclusive in our "Boiler Logic," a copy of which will gladly be sent upon request.

All Heine Boilers conform to the A. S. M. E. Boiler Code.



A typical large two-pass Heine Boiler; note the compact arrangement of tubes, as indicated by the spacing of the handhole plates on the front water-leg.

HEINE SAFETY BOILER COMPANY
5321 MARCUS AV. ST. LOUIS MO.

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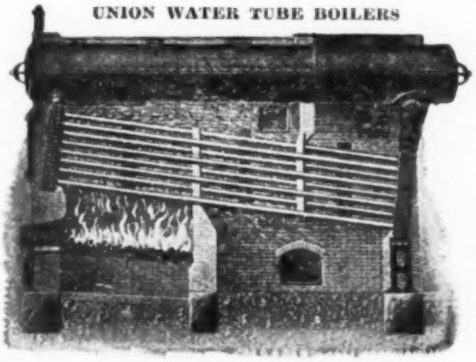
UNION WATER TUBE BOILERS



Built in Various Sizes for all Practical Pressures

True Boiler Economy embraces three vital essentials:

Continuous efficient operation
Maintenance expense
Original cost of installation

The UNION WATER TUBE BOILER

has more practical features tending toward the first essential than any other Water Tube Boiler made today. The maintenance is unusually low, due to proper provision to take care of distortion, and elimination of double thickness of plates or rivets in fire. The first cost of installation is consistent with quality and efficiency, and low where these features are considered.

It will pay you to get in touch with our office in your district or to send for our catalog.

UNION IRON WORKS - - ERIE, PA.

SPRINGFIELD ALL STEEL Sectional Water Tube BOILERS

No Stay Bolts *No Rods or Braces* *No Bent Tubes*

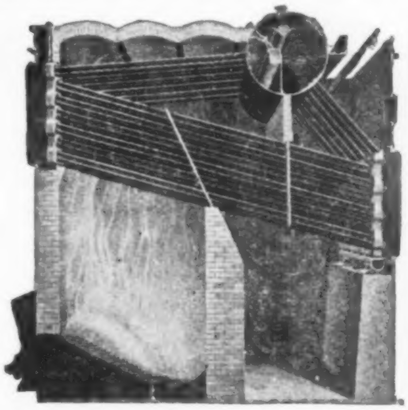
ONE HANDHOLE for each FOUR tubes—one third the number of handholes required by other horizontal water tube boilers.

SPRINGFIELD Water Tube Boilers amply fulfill every boiler need, and to them all methods of firing may be applied. There are many special features of construction and operation in which you will be interested.

Write for our catalog and further information.

SPRINGFIELD BOILER CO.

A Springfield Illinois



Erie City Boilers

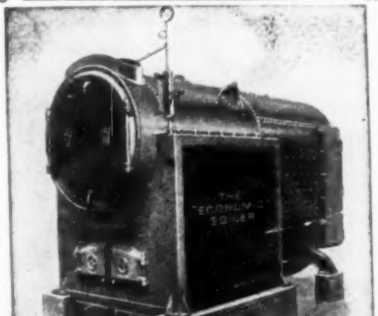
Erie City Return Tubular Boiler

Erie City Boilers are Safe—

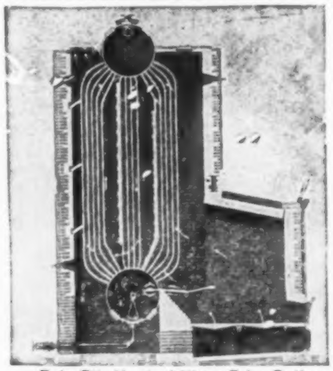
Every Erie City Boiler is built to meet the specifications of the A. S. M. E. Boiler Code and is therefore safe. The A. S. M. E. Boiler Code is recognized as the standard—it is the collective knowledge and experience of experts—its wide adoption has eliminated unnecessary risk and protects human life and property.

Before you install that new unit—get the facts and figures on Erie City Boilers

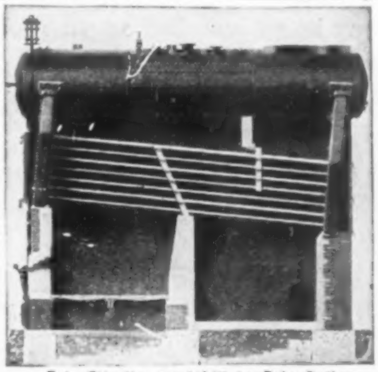
All types All sizes



Erie City "Economic" Boiler



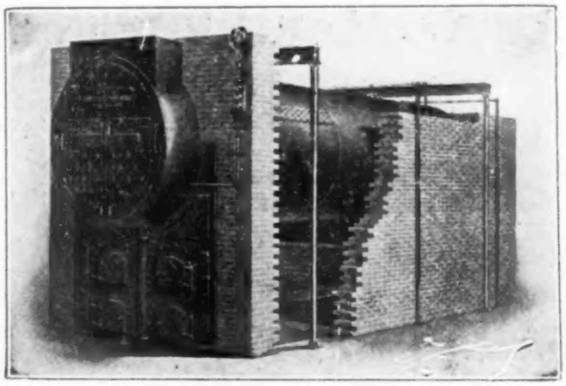
Erie City Vertical Water Tube Boiler



Erie City Horizontal Water Tube Boiler

ERIE CITY IRON WORKS – *Erie, Pa.*

Manufacturers of Steam Engines, Boilers and Feed Water Heaters, Horizontal and Vertical Water Tube Boilers and Lentz Engines.



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EDGE MOOR WATER TUBE BOILERS

These cannot be explained in the limited space of an advertisement. Those interested in steam boilers and in tests of unusual performances should send for our illustrated bulletins. The details of design and construction which assure a minimum of heat losses, low fuel cost, and general all round reliability and satisfactory service are fully given. The Edge Moor boilers

Meet the Exacting Conditions of Modern Power Plants and are Especially Suitable for those of Large Size

Our Literature Will Show Why; Send for It

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LOPULCO POWDERED FUEL SYSTEMS

Can be installed without interference with the operation of your plant

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Simplicity Counts

Get the facts from us now

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Prepare

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Pulverizer Mills, Crushers, Dryers, Pulverized Coal Feeders. Especially adapted to Steam Boiler, Billet, Forging, Annealing, Puddling, Open Hearth, Nodulizing, Ore Roasting and Rotary Calcining Furnaces

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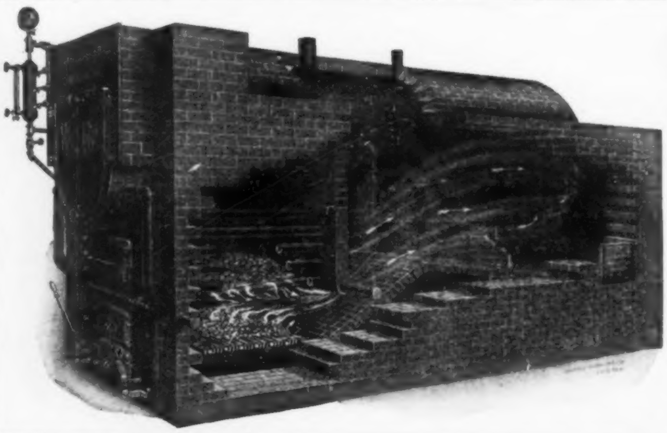

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Down Draft **Detachable Firebox**

An absolutely smokeless boiler that is guaranteed to consume 95% of smoke from any grade of mine coal and to increase the boiler capacity from 5 to 25 h.p., depending on size.

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Some Important Papers On Fuels and Combustion

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THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
29 WEST 39th STREET, NEW YORK

JONES "A-C"

The Jones "A-C" is a high-duty stoker, not only in name, but in *service.* It will operate more efficiently and cost less per ton of coal burned because it fulfills a rigid set of requirements met by no other mechanical stoker.

Overload Capacity—Operated at highest boiler capacity for indefinite periods.

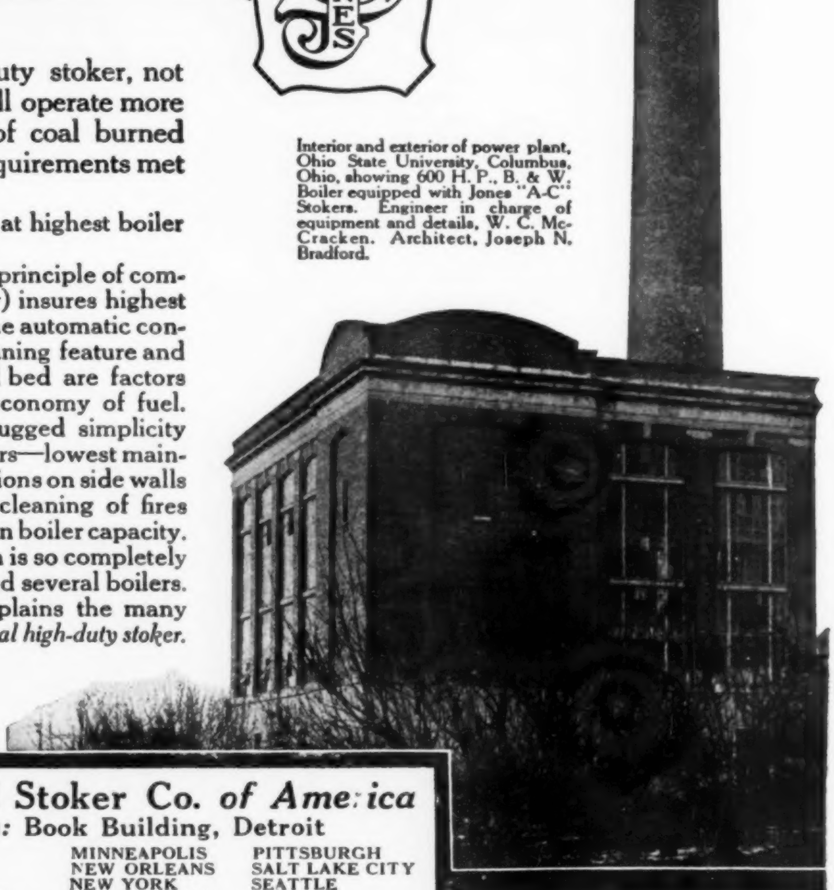
Fuel Economy—The under-feed principle of combustion (originated by this company) insures highest efficiency with any grade of coal. The automatic control of fuel and air, the automatic cleaning feature and the mechanical movement of the fuel bed are factors which combine to insure greatest economy of fuel.

Continuous Operation—The rugged simplicity means little or no shut-downs for repairs—lowest maintenance. Prevention of clinker formations on side walls and "automatic-cleaning" eliminates cleaning of fires which, in most stokers, causes slumps in boiler capacity.

Lowest Labor Costs—Operation is so completely automatic that one man can easily tend several boilers.

The extensive "A-C" catalog explains the many economic advantages of installing a *real high-duty stoker.*

Interior and exterior of power plant, Ohio State University, Columbus, Ohio, showing 600 H. P., B. & W. Boiler equipped with Jones "A-C" Stokers. Engineer in charge of equipment and details, W. C. McCracken. Architect, Joseph N. Bradford.



The Under-Feed Stoker Co. *of America*

General Offices: Book Building, Detroit

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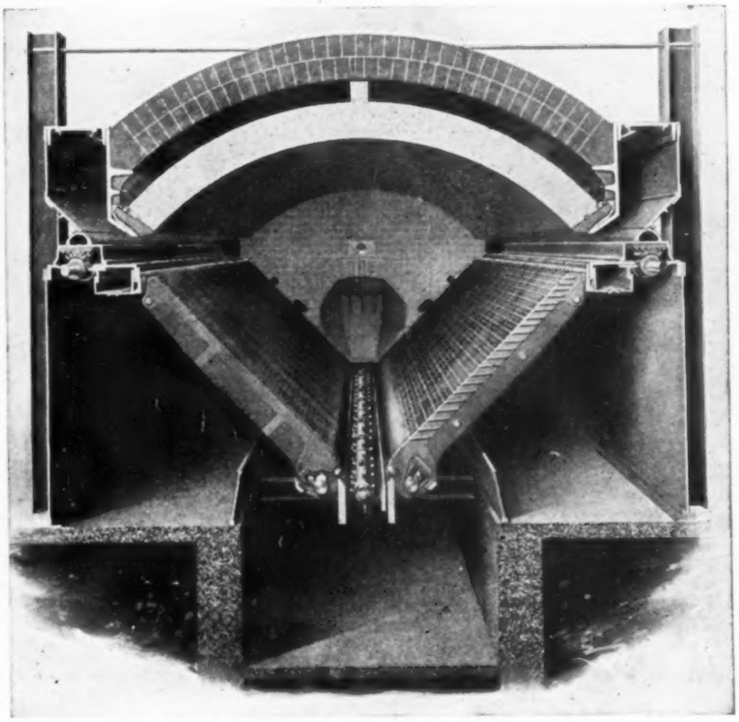
BUFFALO	CLEVELAND	NEW ORLEANS	SALT LAKE CITY
CHARLOTTE	DENVER	NEW YORK	SEATTLE
CHICAGO	KANSAS CITY	PHILADELPHIA	

The Under-Feed Stoker Co. *of Canada, Ltd.*

81 Victoria St., Toronto

Sole Manufacturers in the United States and Canada of the Jones Under-Feed Stoker.

OVER 6,000 BOILERS FIRED BY MURPHY FURNACES



Murphy Furnaces have been relied upon by power users in every field for 14 years to furnish continuous, efficient and economical combustion service—to burn any available fuel—and to automatically remove all ash and refuse.

Factors Back of Every Installation of
MURPHY FURNACES

Natural Draft—on everything except the most extreme peak loads. Will double the output of your boilers without one penny for draft.

Burn any fuel. This is the biggest possible feature for the engineer to consider at the present time.

Standard—The Murphy Furnace is standard in design. All new features produced from time to time may be applied to any Murphy Furnace now in use.

Smokelessness. The Murphy Furnace is designed to afford perfect combustion. The arch insures high furnace temperature which means that the air is preheated and admitted exactly where and when needed to give maximum efficiency.

Automatic Operation. The amount of fuel supplied may be regulated while in operation. Every detail for keeping a perfect fire is provided in the design and construction of the Murphy Furnace. The coal is supplied—the fire distributed evenly—the ash removed—continuously and automatically.

Today *over 6,000 Boilers* in all sections of the country are fired by

MURPHY
AUTOMATIC
FURNACES

They are being used in practically every line of industry—from hospital to industrial and central station service.

Write for catalog showing how *Murphy Furnaces* can be installed under any type of boiler.

MURPHY IRON WORKS, Detroit, Mich., U.S.A.

BURN ANY FUEL THAT HAS HEAT IN IT

COMBUSTION

The application of stokers to the problem of utilization of waste fuels is only one of the many services of a large and thoroughly posted research department which we maintain.

If you have a combustion problem, or even if you only think you may have one, it will be worth your while to get in touch with us.

Combustion Engineering Corporation

11 Broadway, New York City

Owners and manufacturers of

Lopulco Pulverized Fuel Systems
Type "E" Stokers—for Bituminous Coal
The Grieve Grate—Hand-Firing
Coxe Stokers—Anthracite Coal and Coke Breeze

PHILADELPHIA, PA. PITTSBURGH, PA. DETROIT, MICH. MINNEAPOLIS, MINN.
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DENVER, COLO. OMAHA, NEB. TAYLOR ENGINEERING CO., VANCOUVER, B. C.
ATLANTA, GA.

Which method are *You* using

The Wasteful Way or *The Files Way*

If your fireman must open the furnace door every time he wants to distribute the coal or clean the fire—you're losing money! Constantly opened doors bring an excessive inrush of cool air that destroys the draft, chills the gases and reduces the steam pressure.

It is the wasteful way to handle your boilers. The coal can't give you maximum heat value; the boilers can't give maximum capacity.

The levers at the Boiler Front will do all your work

Would you be interested in knowing that Files Stokers enable you to trim your fire, distribute the coal, break up clinker and remove the ash without opening your furnace doors even once? Simply work the hand levers at the boiler front and every operation is performed,—no slicing bars; no open doors, no ugly, sweltering heat to face the fireman. Operate another lever and the ash is removed. A clean, even fire is assured at all times with but little time and labor consumption.

The Files Way is the efficient way. Files Stokers render all the advantages of mechanical stokers without their high cost of upkeep; they will bring the highest evaporation from the poorest coal.

Write to-day for Catalog "H" and learn why a number of nationally-known manufacturers are effecting large savings through the use of Files Stokers.

THE FILES ENGINEERING CO., Inc.
75 Westminster St., Providence, R. I.

Branches in Principal Cities

Files Stokers

Hand Operated

The Secret of Quick Pick-up

TWO distinctive features embodied in the design of Illinois Stokers have actually given the chain grate wings: Mechanical ignition is one; the other is the now famous Illinois Air Control.

Illinois Mechanical Ignition consists of an individual draft tuyere, close to the fuel gate, which draws a small portion of the hot gases through the incoming green fuel, thereby insuring rapid, thorough ignition of high-moisture low volatile fuels such as lignites, culm, anthracites, and coke braize.

Illinois dampered air control means most air where most needed. The supply of air, rather than the amount, is controlled. High efficiency at all loads is the result.

Write Dept. "C" for new catalog and go deeper into the subject of quick pick-up.

ILLINOIS STOKER CO., ALTON, ILL.

Illinois Stokers are made in two types: Type "A" natural draft, and Type "G" forced draft with mechanical ignition for burning high moisture and low volatile coals. Both type "A" and Type "G" have the famous Illinois dampered air control.

ILLINOIS CHAIN GRATE STOKERS With Dampered AIR CONTROL

A BAYER for every type of boiler

For every type of boiler, there is a special Bayer blower that will give continued economical and thorough tube-cleaning service. Installations are quickly and easily made, usually without disturbance to boiler settings. Over two and one-half million h.p. of boilers thoroughly cleaned every few hours with Bayer blowers, saving 4 to 9% in fuel alone.

Write for Special Literature

Ask for complete descriptions of the different types of Bayer blowers. Tell us the number, type and h.p. of your boilers—we will show you conclusively why you should install Bayers.

BAYER STEAM SOOT BLOWER CO.
4068 Park Ave. St. Louis, U. S. A.

The BAYER Steam Soot Blower

TAKE ADVANTAGE OF
YOUR OPPORTUNITY
LIBERTY BONDS

The world's premier investment can be bought at low prices *NOW*

HOLD WHAT YOU HAVE
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Buy them at any bank or from a reputable broker

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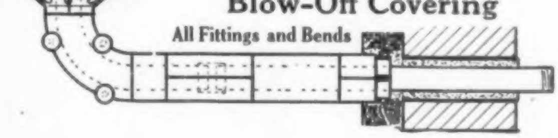
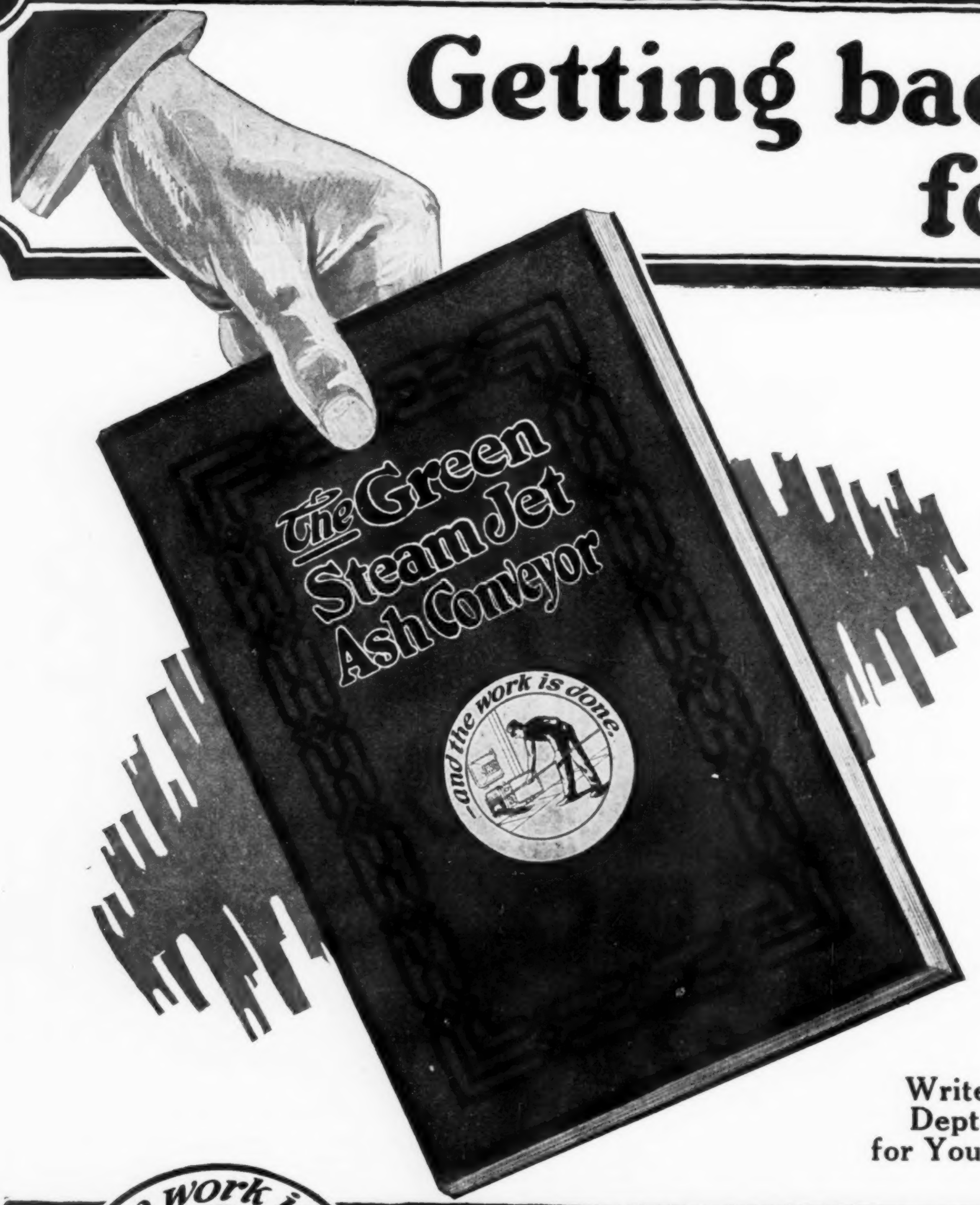
The Woolson E-Z-SET Air Chambered Removable Fire Clay Blow-Off Covering



It meets all requirements,—This style pipe covering can be made of carborundum, asbestos, cork, etc. Write for information and prices.

Manufactured by
O. C. WOOLSON'S SONS
39 Cortland St., New York City

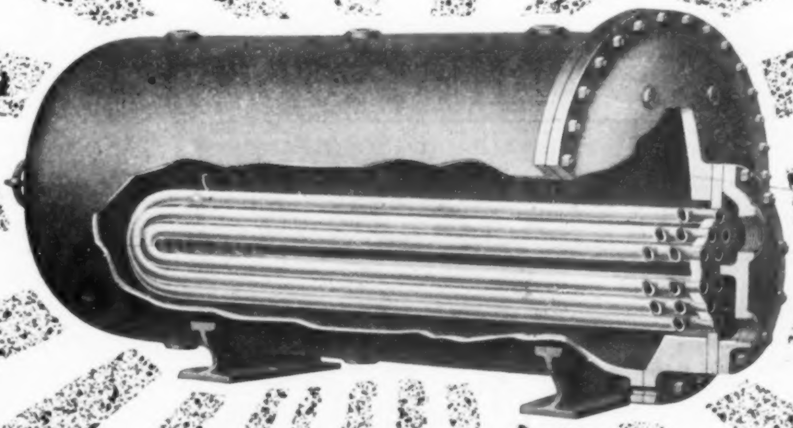
Getting back for



Write to
Dept. M
for Your Copy

—and the work is done.

GREEN




-made to last a long time
LUNKENHEIMER
"RENEWO" VALVES
The "RENEWO" Renewable Seat
Have achieved an enviable record for economy in steam service. They represent the highest development in valve construction, incorporating all the good features discovered and developed in over half a century of valve manufacture.
Their installation means permanence in the line, because they are as near wear proof as can be attained, and to further enhance their durability all the parts are interchangeable and can be replaced should necessity require.
"Renewo" Valve parts are made of materials best suited to the duty the part performs.
The Renewable Seat and Disc are made of Lunkenheimer "Valve-nickel," a material having exceptional wear-resisting qualities; the Disc is provided with the celebrated Lunkenheimer "Seat-guard" which aids in preserving the seating faces and keeping them clean, and the seating surfaces are regrindable. The stem is made of a special bronze; the thread is extra long and has full contact when valve is opened or closed.
The union bonnet connection with outside protected threads; deep stuffing box with gland follower, and the self-cooling malleable iron handwheel are other points of merit.
Globe, Angle, Cross, Straightway or Y and Horizontal and Angle Check Patterns for 200 and 300 pounds working steam pressures. Specify LUNKENHEIMER "RENEWO" and insist on having the genuine.
Write for descriptive booklet F 535—D.
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THE LUNKENHEIMER CO.
"QUALITY"
LARGEST MANUFACTURERS OF HIGH GRADE ENGINEERING SPECIALTIES IN THE WORLD
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AMERICA'S BEST
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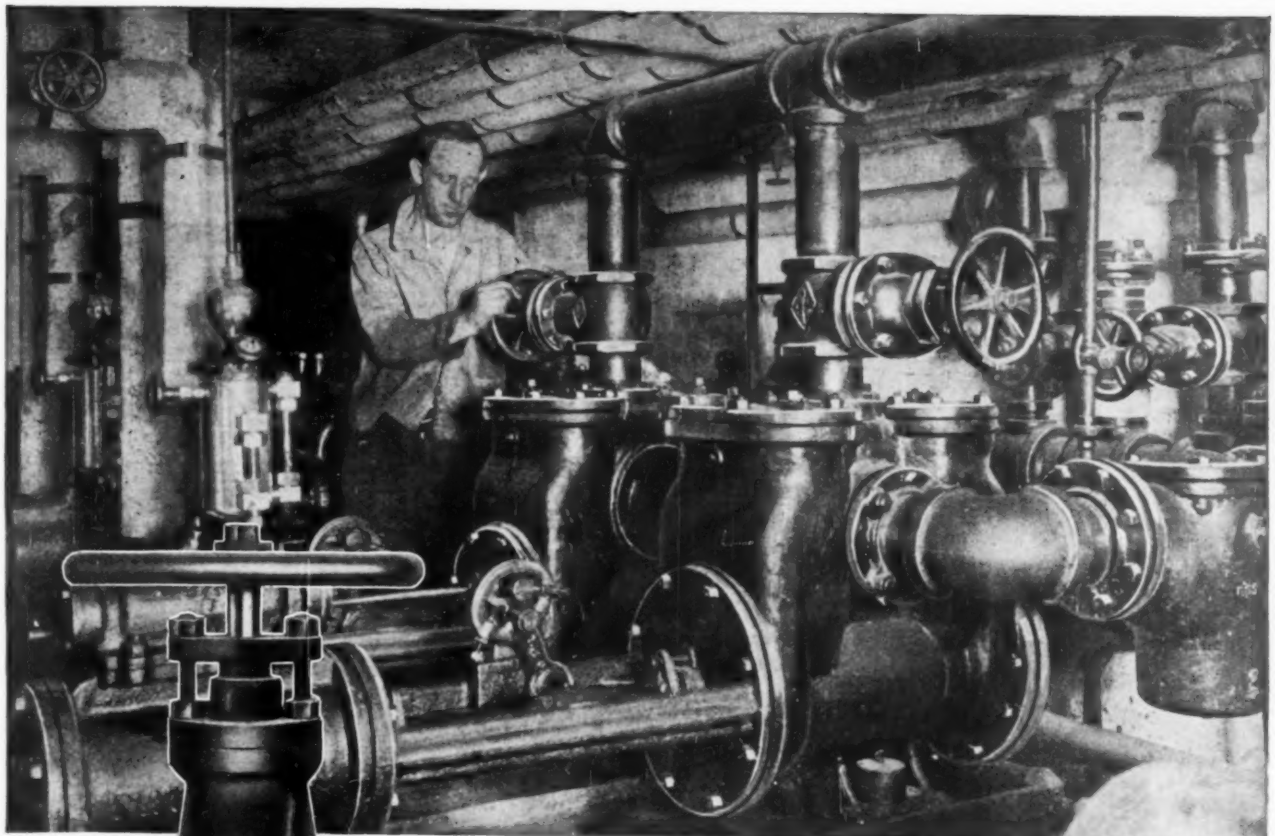

Jenkins Standard Iron Body Gate Valves on fresh water pumps—Ambassador Hotel, Atlantic City, N. J.

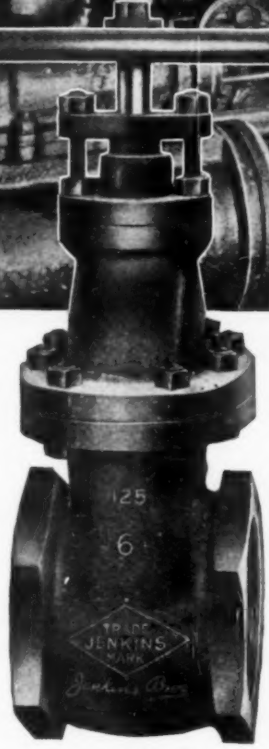

FIG. 325

REG. U.S. PAT. OFF.
TRADE
JENKINS
MARK
Jenkins Bros

Jenkins Valves are obtainable through supply houses everywhere. Know Genuine Jenkins Valves by the Jenkins name and "Diamond Mark."

Jenkins Standard Iron Body Gate Valves

Jenkins Standard Iron Body Gate Valves, are made in sizes up to 30 in. for steam and water service. They are of the double face solid wedge type. The bodies and bonnets are made of high-grade cast iron. The seat rings are bronze and the gates or wedges cast iron faced with firmly secured bronze rings, except in the smaller sizes, in which the wedges are made entirely of bronze. The wedges have guides which cause them to slide smoothly and true, and prevent chattering when partially open, or touching the seat except at point of final closing. All parts are interchangeable and can be supplied promptly.

JENKINS BROS.

New York, Boston, Pittsburgh, St. Louis, Philadelphia, Washington, Chicago, San Francisco, Montreal, London, Havana

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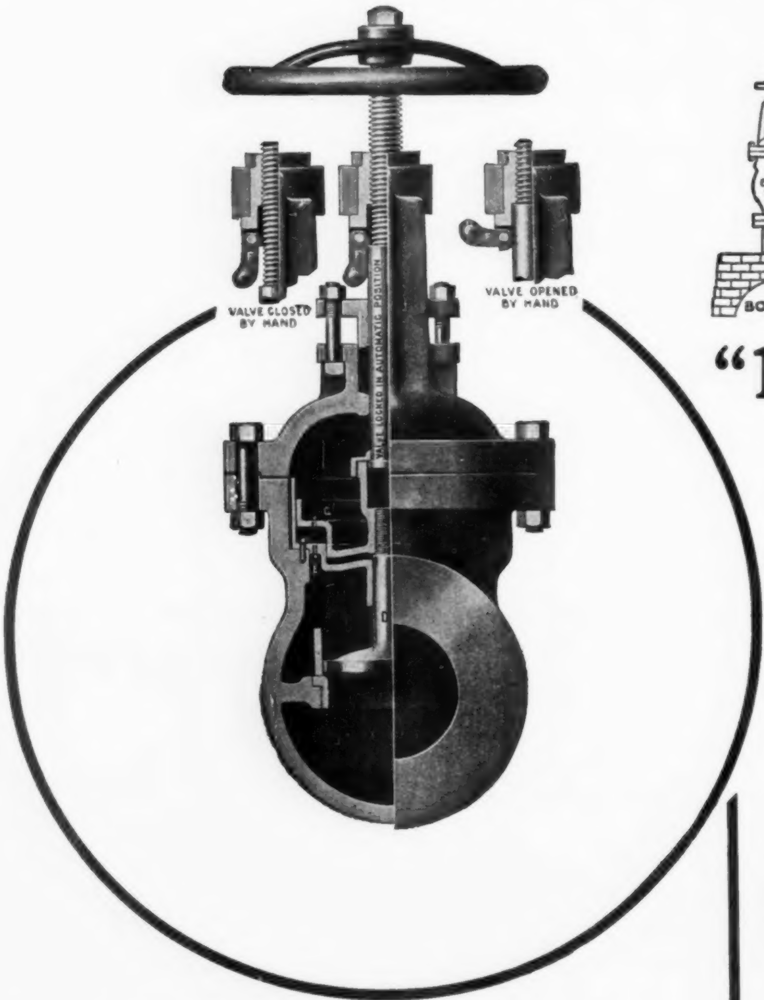
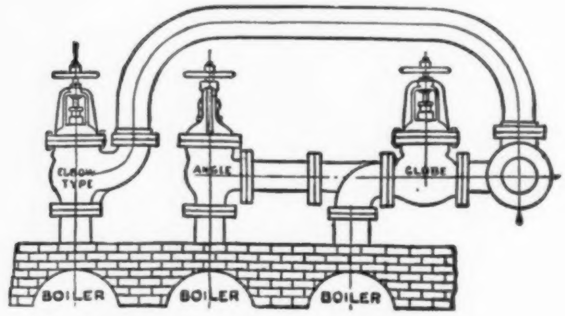
Jenkins Valves

SINCE 1864

Consider the Lives of Your Men and Protect Your Property

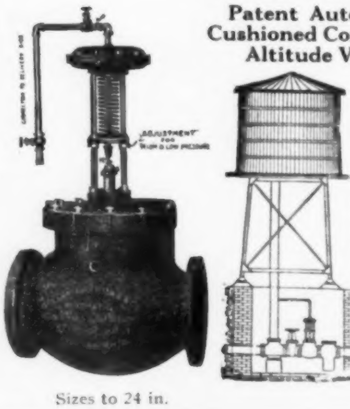




"1960 Hosts of References Used by U. S. Steel Corp."

"No Shut Down When a Tube Bursts"

Golden-Anderson
Patent Automatic Cushioned Controlling Altitude Valves

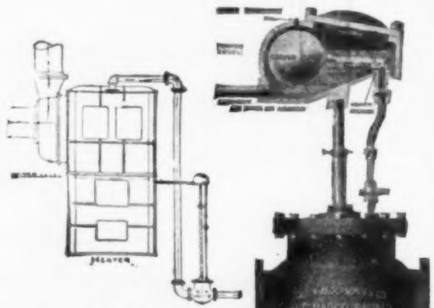


Prevent water waste by carrying a constant water level in reservoirs and stand-pipes. No floats or fixtures inside or outside of tank.

Sizes to 24 in.

Golden-Anderson
Patent Automatic Cushioned Controlling Float Valves

A uniform water level in feed water heaters prevents water and fuel waste.



Feed Water Heater

These G. A. Pat. Double Cushioned Automatic Combination Non-Return and Triple-Acting Valves are a vital safety necessity. They will instantly cut a boiler out of the line when a tube ruptures. Also shuts off steam from all boilers when a header breaks. Can be opened by hand. The only valves that can be tested in service without interfering with the operation of the plant.

GOLDEN-ANDERSON VALVE SPECIALTY CO.
1228 Fulton Building, Pittsburgh, Pa.

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During the past five years 27 per cent of our output has been purchased by concerns rated at a million dollars or more—big concerns like Colgate & Co., Standard Oil Co., Victor Talking Machine Co., Ford Motor Co., Woolworth Bldg., Metropolitan Life Insurance Co., Bethlehem Steel Co.

Big companies can afford to hire big men to select their valves and asbestos packed cocks. And big men, like big companies, don't make any mistakes. They *know* what they're doing when they place an order.

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Manufacturers of Valves and Asbestos Packed Cocks.

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in ALL BRANCHES of the ENGINEERING FIELD

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Power Plants	**Heating and Ventilating**	**Management**
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GENUINE WROUGHT IRON
FULL WEIGHT GUARANTEED

The Name and Year of Manufacture is rolled in every length as a guarantee of durability.

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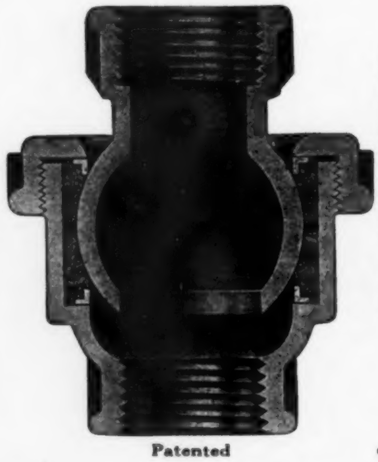
Bulletin No. 38,—
"The Installation Cost of Pipe"

A. M. Byers Company, Pittsburgh, Pa.
ESTABLISHED 1864
New York Boston Philadelphia Cleveland Chicago Dallas

Barco Flexible Joints
For

Use wherever a Flexible Connection is required for high or low Pressure, Steam, Vacuum, Water, Oils, Benzines, Naphtha, Air and Gas, in place of Rubber or Metallic Hose, Expansion Joints, Special Pipe Bends, etc. All styles, Straight, Angle, Male, Female and Flange ends.



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Locomotive and Car Steam and Air connections, Round house and Coach Yard Steam connections, Steam Shovels and Dredges, Oil handling plants, steel mills, mines, quarries, engine testing, and in fact nearly every industry.

Over ten years' extensive and successful experience in all branches of engineering.

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CAST IRON PIPE

TYPES	FOR
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POWER PLANT PIPING

—SERVICE THAT PAYS DIVIDENDS

An incorrectly assembled pipe or valve joint may be the cause of a complete shut down to your power plant sometime in the future. Proper piping may seem a trifling detail now Mr. Engineer, but it is the little details like this that cause large losses, not only in installation but also in everyday maintenance. In considering the installation of new piping, it pays to employ piping specialists, who have the foresight combined with the proper experience to design good power plant piping.

The Dougherty Methods and records of solving power plant difficulties are well worth investigating. Here are a few salient features for your consideration.

¶ We have a new factory to offer increased facilities for handling your largest piping requirements.

¶ Modern methods of manufacture, the use of which saves you installation and in maintenance.

¶ An efficient staff, augmented by recent additions—real piping specialists.

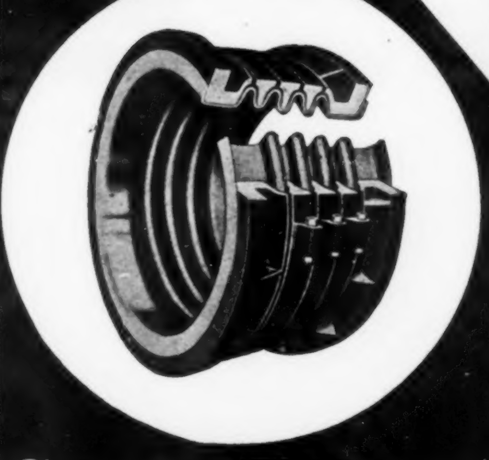
¶ A sales service whose every moment and capable ability is ever at your command.

¶ And lastly, prices that are right—low when quality is considered—and delivery which is in keeping with present conditions.

Let us try to save you money. No charge for advice or cost estimate. Write today for full data.

M. J. DOUGHERTY CO.
PIPING FABRICATORS & CONTRACTORS
FACTORY & MAIN OFFICES—25th & WASHINGTON AVE. PHILA. PA.
25 W. 43rd Street New York — 521 Hurt Building Atlanta — 112 W. Adams St. Chicago

OUR LINE Includes



BADGER

Will prevent leaks in air, water, gas, oil, and all pipe lines.

Self Equalizing Expansion Joints

E. B. BADGER & SONS CO.

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R
OIL FILTERS
P
SCIENTIFIC LUBRICATION

Reduce Oil Consumption 25% to 75%

R-P Oil Circulating and Filtering Systems collect all the oil after it is used on the bearings, pump it to a filter where all dirt, grit, and water are removed and redistribute it to the bearings again—all automatically.

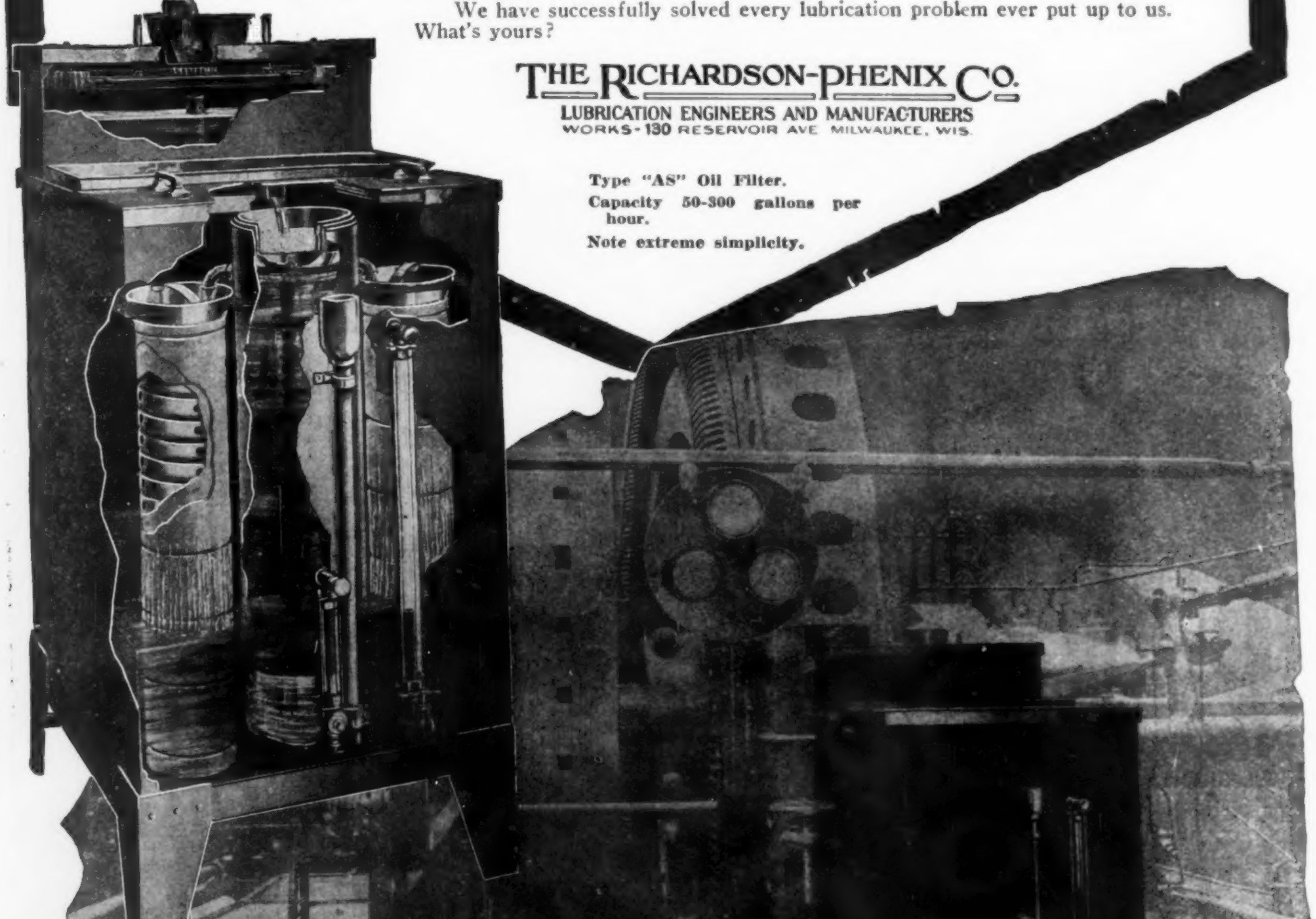
Thus the bearings are always *automatically* supplied with clean, cool oil—insurance against hot bearings when attendant is unexpectedly called from the engine room. Oil waste is eliminated, oil consumption reduced 25% to 75%, and a steady stream of clean, cool oil is fed continuously to each bearing, reducing friction so that steam consumption is reduced 2% to 10%.

There is an R-P Oiling System suitable for every condition. For plants having but a single engine, the Type "SR" Filter, shown below, is most suitable. The dirty oil drains to a strainer well, from which it is pumped to the filter mounted on the engine room floor and the filtered oil redistributed to the bearings—all automatically.

Bulletin M25 describes R-P Oil Filtering Systems and their application in detail. It's a real engineering book. A copy is yours for the asking. Write for it today.

We have successfully solved every lubrication problem ever put up to us. What's yours?

THE RICHARDSON-PHENIX CO.
LUBRICATION ENGINEERS AND MANUFACTURERS
WORKS-130 RESERVOIR AVE MILWAUKEE, WIS.



Type "AS" Oil Filter.
Capacity 50-300 gallons per hour.
Note extreme simplicity.

WATER METERS OF ALL TYPES

A Suitable Meter For Every Service

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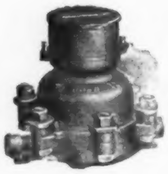
In a class by itself. The best fluid measuring device in the world.



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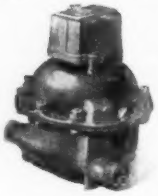
The old familiar disc style. Slow moving disc, sturdy construction. An excellent article.



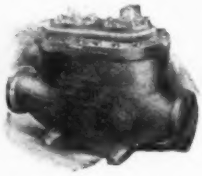
CROWN

The original rotary piston type. Superior design, substantial, long-wearing, satisfactory.

All These Meters are Built on the Honor Plan. They are Backed by a Long Record of Square Dealing and Represent an Experience in the Meter Business That Covers Half a Century. Write for Particulars.

GEM

A velocity meter of great merit. Large capacity, compact construction. Ideal for heavy work.



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The unsurpassed accuracy of the Empire combined with the capacity of the Gem. Simple, strong and reliable on all sized streams.

PREMIER (below)

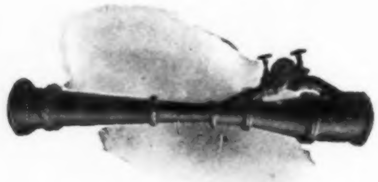
A Venturi type for use on large mains.

NATIONAL METER CO.

ESTABLISHED 1870

Main Office
299 Broadway, N. Y.

Branches In
Other Principal Cities



Save Coal with a

Bailey Boiler Meter

Bailey Boiler Meters give in the simplest manner the required facts for economical boiler operation. They continuously record on one chart, Steam Flow, Air Flow, and Flue Gas Temperature.

They show the relation between fuel and air supply and integrate steam output.

Every boiler in your power plant should be operated under the guidance of Bailey Boiler Meters to make sure that efficient combustion conditions prevail.

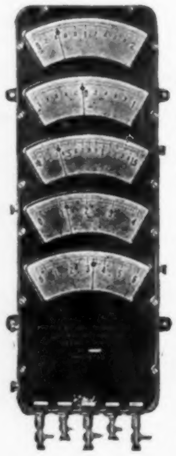
Our engineers would be pleased to take up your special requirements in detail.

Send for Bulletin

Bailey Meter Company

2009 E. 46th St., Cleveland, Ohio

Knowledge Where Needed



5 in 1

Indicating Draft Gauge for use with boilers having Coxe or Harrington Stokers.

Gives the fireman an opportunity to operate efficiently.

Bulletin 5E.

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Harwood Elec. Co., Harwood, Pa.
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PRECISION INSTRUMENT CO.

21 Halsey St. **Newark, N. J.**

When Machines Look Out for Production

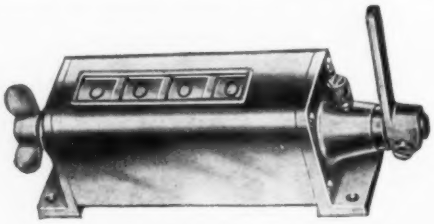
Why not give your machine a little control over the *operative,* instead of giving the operative sole control over the machine?

The machine equipped with a Veeder Counter will often get more out of the operator than the operator would get out of the machine—were his record less in evidence.

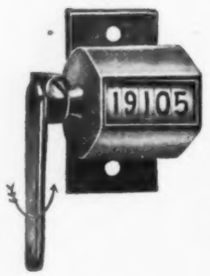
Always keeping the production-figures *before* the worker and the employer—

Veeder
COUNTERS

compel a creditable showing, where uncreditable ones formerly went unnoticed.



The above **Set-Back Rotary Ratchet Counter** registers reciprocating movements of the lever, as required in counting the output of punch presses. Sets back to zero from any figure by turning knob once round. Supplied with from four to ten figure-wheels, as required. Price, with four figures (as illustrated), \$11.50 (list). Equipped with lock and keys to prevent tampering with the record, \$2.00 extra. *(Cut ½ size.)*



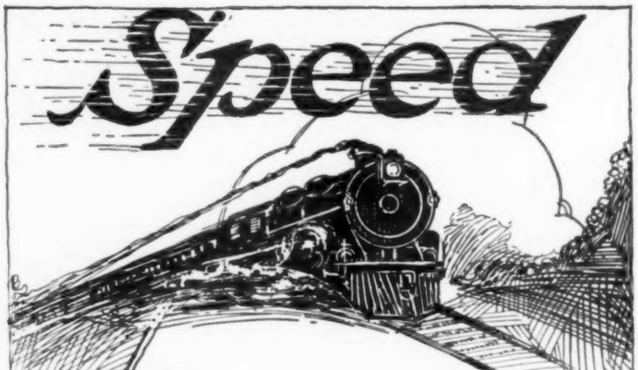
This *small* **Rotary Ratchet Counter** (No. 6) counts reciprocating movements as required in recording the product of the smaller punch presses. When the lever is moved through an angle of 40 to 60 degrees, the counter registers one. A complete revolution of the lever registers ten. This counter is adaptable to no end of small machines, simply by regulating the throw of the lever. Price \$2.00. *Cut nearly full size.*

Send for booklet, "Checking Up Production;" it's a cyclopaedia of counters for all purposes.

The Veeder Mfg. Co.

16 Sargeant Street, Hartford, Conn.

Pacific Coast Distributor: F. Somers Peterson Co., 57 California St., San Francisco, Cal.



In Electric Generating Plants, in Factory Power Plants, in Pumping, in Grinding Operations—in practically every Industrial Process, controlled speed is an important factor.

A glance at the sharp-breaking efficiency curve of any prime mover or converter suffices to show how vital it is that speed be held within fixed limits.

S & B
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are manufactured in many styles, for every possible use.

We list Hand Tachometers, and stationary Tachometers of both indicating and recording types, and are prepared to supply on short notice special instruments for measuring speed, distance, gallons of water due to pump speed, etc.

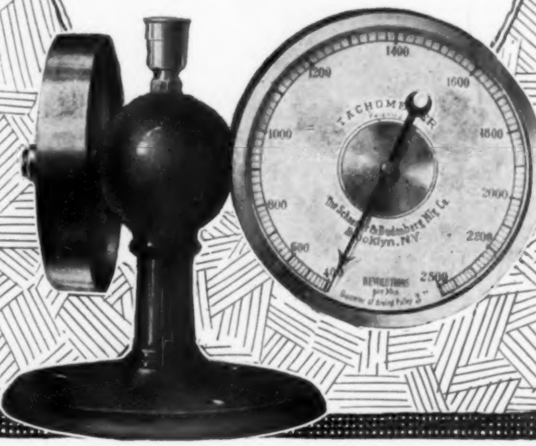
Write for Bulletin M. E.

The Schaeffer & Budenberg Manufacturing Co.

Brooklyn **New York**

For sixty-nine years manufacturers of precision instruments.

Chicago, San Francisco, Los Angeles
Philadelphia, Pittsburgh, Tulsa
Washington, Detroit



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Saves
Slippage
and
Space

F. L. SMIDTH & CO., Engineers
50 Church Street New York

Modern and Approved Appliances for the Transmission of Power

SHAFTING HANGERS
COUPLINGS PULLEYS
COLLARS BELT TIGHTENERS
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ROPE DRIVE EQUIPMENTS

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CHAMBERSBURG, PA.

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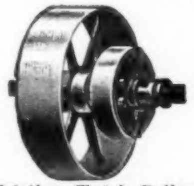

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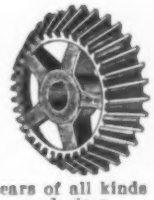
POWER TRANSMISSION MACHINERY
DESIGNED, FURNISHED AND ERECTED

SPECIAL MACHINERY IRON CASTINGS

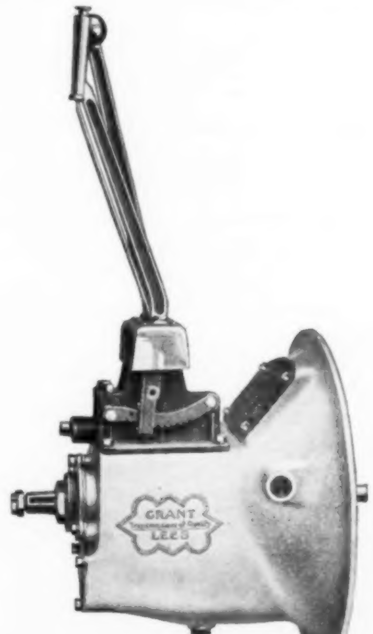


Gears of all kinds and sizes

Works: ELIZABETHPORT
NEW JERSEY

SEE OUR DATA IN 1920 A.S.M.E. CONDENSED CATALOGUES OF MECHANICAL EQUIPMENT

Sales Room: 79 BARCLAY ST.
NEW YORK CITY



Grant-Lees Transmissions

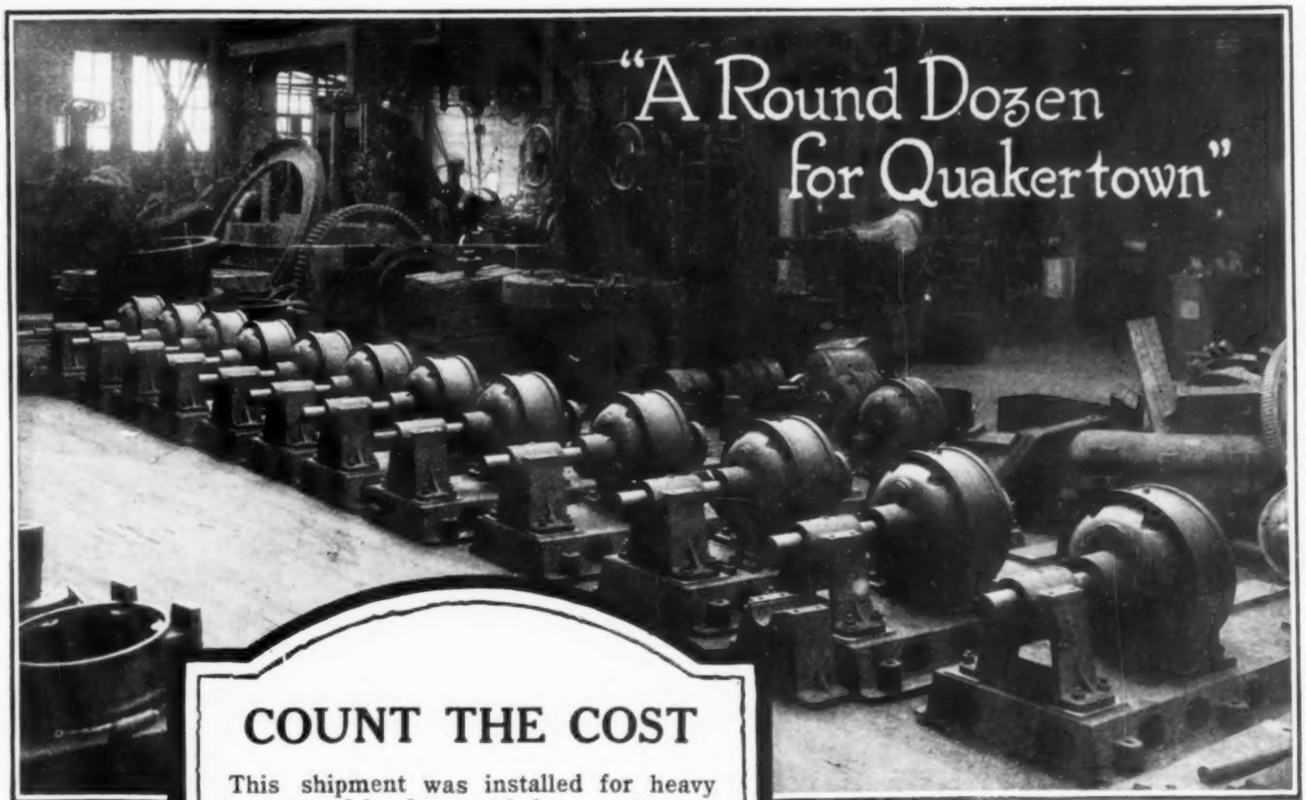
Manufactured by
THE GRANT-LEES GEAR CO.
CLEVELAND, OHIO

MEDART
Steel-Rim Split Pulleys

MEDART Steel-Rim Pulleys are absolutely free from shrinkage strain, definitely retain their shape and do not wreck from centrifugal force. Designed for any service. Sizes range from 8-in. diameter, 3-in. face, to 15-ft. diameter, 50-in. face. Send for Catalog No. 26 or Supplement 1-A, or submit specifications for our engineers' estimate.

MEDART PATENT PULLEY COMPANY
Office and Warehouse: Cincinnati
General Offices and Works St. Louis, U. S. A.
Offices: Chicago and Philadelphia

MEDART means EVERYTHING in LINE SHAFTING EQUIPMENT



COUNT THE COST

This shipment was installed for heavy conveyor drive from 7-$\frac{1}{2}$ h. p. motors at the plant of the Cambria Steel Co., Philadelphia.

It is not chiefly to save installation and running costs that basic industries depend increasingly on JONES speed reducers—economy is only one of their advantages, compactness another, simplicity, ease of maintenance, and adaptability to factory conditions are others—but there's a *fundamental* reason.

Any power-weakness can tie up several factory departments; a breakdown costs too much—and the JONES reducer meets all tests—transmits the power without appreciable loss, sturdily and steadily, from year-end to year-end. *It keeps its promise.*

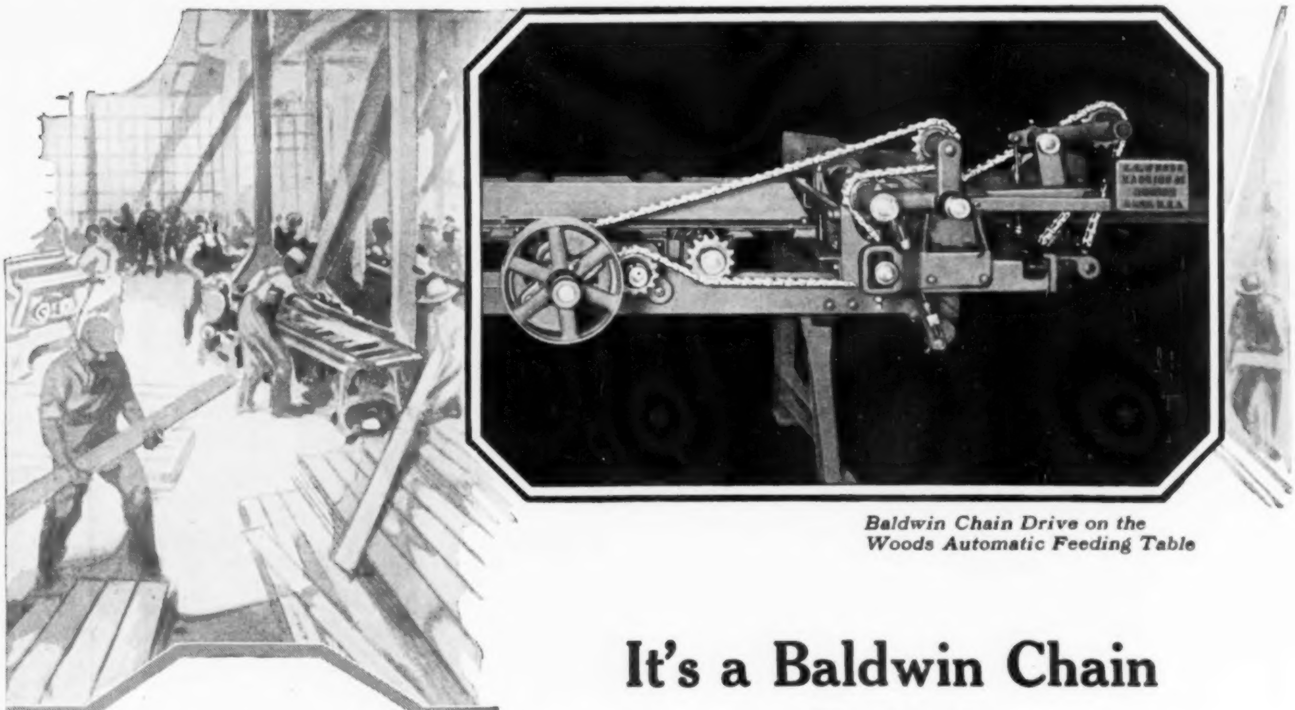
Write today for illustrated bulletin, containing full description of single and double types, part lists, instructions for installation, etc. Our engineers will gladly help you solve any reduction problem.

JONES
Spur Gear Speed Reducers

A Shipment for
CAMBRIA STEEL

W. A. Jones Foundry & Machine Co.
4400 West Roosevelt Road, *Chicago.*
New York 20 Murray St.

Manufacturers of Cast Iron Pulleys, Gears of All Kinds, Couplings, Lemley Friction Clutches, Pillow Blocks, Hangers, Speed Reducers and General Power Transmission Machinery.



Baldwin Chain Drive on the Woods Automatic Feeding Table

It's a Baldwin Chain Drive!

Just another Baldwin Chain Drive, quietly, efficiently performing its appointed task—one of the thousands of such drives in daily use.

If your problem is to secure for the machine you design or build, a drive of positive action, one of lowest friction resistence, longest life and free from care in its operation—then you, too, will want a Baldwin Chain Drive.

Perhaps our engineers can help you. It costs nothing to ask them.

BALDWIN CHAIN & MANUFACTURING COMPANY
WORCHESTER, MASS.

H. V. GREENWOOD, *General Western Sales Agent*
PEOPLES GAS BUILDING, CHICAGO, ILL.

Ask these Baldwin Distributors

Boston, Mass.	Walter H. Williams, 175 Massachusetts Ave.
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Cincinnati, Ohio	Wirthlin-Mann Co., 318-320 West Third St.
Cleveland, Ohio	Chain & Sprocket Service Co., 1794 East 55th St.
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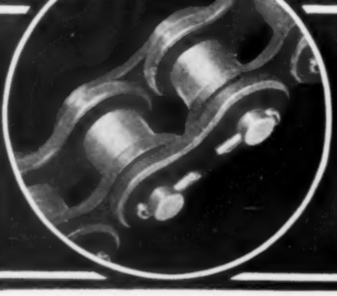
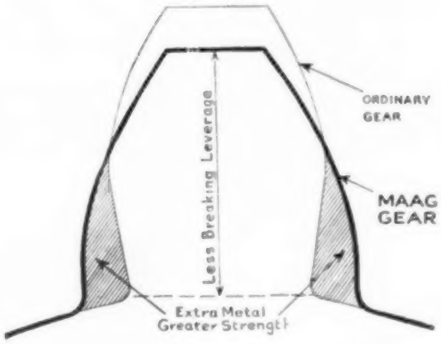
Providence, R. I.	Lanphear Motor Car Co., 17 Snow St.
San Francisco, Cal.	The Adams-Hill Co., 96 9th St.
Seattle, Wash.	Wade & Co., 1423 Twelfth Ave.
St. Paul, Minn.	C. J. Smith Co.
St. Louis, Mo.	American Automobile and Supply Co., 3200 Locust St.
Toronto, Ont.	Lyman Tube & Supply Co., 33 Melinda St.



GENUINE BALDWIN CHAINS

Maag Gears are Strongest where others are Weakest

—the difference in tooth outline is the reason



These two tooth-outlines are both taken from 12-tooth pinions. One was cut by the ordinary method; the other is a product of the Maag system of gear generation. The shaded area is the extra metal that becomes a guarantee of added strength to the user of Maag Gears. The shorter tooth length insures less breaking leverage on the base section. When teeth are stressed to their limit they invariably break along the base line. If then this section is not only increased but also subjected to a shorter breaking leverage, a double assurance of superior strength is the result.

These are the two basic reasons for the inherent strength of Maag Gears. Absence of radial flanks and all forms of under cutting always identify them.

MAAG GEARS

225

1. **Quiet and Smooth-running.**
2. **Long-wearing.**
3. **Much Stronger Than Ordinary Gears.**
4. **Accurately Cut.**
5. **Furnished for Odd Distances between Centers.**
6. **Made with Large Gear Ratios.**
7. **Designed for Constant Velocity Drive.**
8. **Made in a Wide Range of Diameters.**

NILES-BEMENT-POND CO.

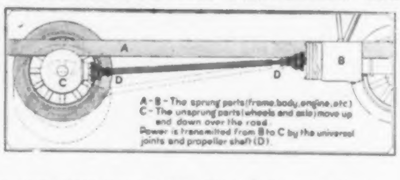
GENERAL OFFICES **111 BROADWAY, NEW YORK**

No greater achievement can be recorded alongside the name of ANY organization than that it does just one thing well—so well that it merits the approval of practically the entire industry of which it is a part.

SPICER MANUFACTURING CORPORATION—SOUTH PLAINFIELD, N.J.

Spicer

UNIVERSAL JOINTS AND PROPELLER SHAFTS



Write on your business letterhead for booklet concerning Spicer Universal Joints and Propeller Shafts.

JOHNSON BRONZE BUSHINGS

bear the same stamp of accuracy. All are mathematically perfect. All carry with them the same guarantee of wear resisting ability.

"The reputation behind the name"

promises you satisfaction and guarantees the ultimate in service.

What are your requirements?

Sales Offices:

New York
Chicago
Pittsburgh
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BUSHINGS

JOHNSON BRONZE COMPANY
NEW CASTLE PA.

The ten-acre plant of the New Process Gear Corporation

A perfected gear-making service!

Two things strike the builder of cars, trucks or tractors who visits the New Process Plant—

—the amount of *detail* involved in making gears of New Process perfection.

—the capacity to fill large orders for gears, each 100% correct, which is represented by 10 acres of latest-type machinery.

Attention to detail and ample capacity assure you right gear-results.

Our engineers are ready to confer with you. A slight change in a few of your gear dimensions may permit you to *save money* by availing yourself of tools which we have ready.

Quality — Quantity — Quickness

New Process Gear Corporation

Syracuse *Member of the* **New York**

New Process Gears

FAFNIR

BALL BEARINGS

Applied to Portable Tools

The rough usage to which portable tools are usually subjected makes it imperative that high grade *ball* bearings be installed to keep down friction and to prevent heating and wear.

For instance, bronze bearings were at one time used to carry the four throw crankshaft to the air drill made by The Cleveland Pneumatic Tool Co. However, they wore rapidly, throwing the crankshaft out of alignment and subjecting the connecting rods and pistons to serious side strain

Fafnir Ball Bearings have entirely corrected the above difficulty and in addition, The Cleveland Pneumatic Tool Co. states that they increase the general efficiency of their drill at least 25 percent.

THE FAFNIR BEARING COMPANY

Conrad Patent Licensee

New Britain, Conn.

DETROIT Office: 752 David Whitney Bldg.

CHICAGO Office: 1101 Michigan Ave.

CLEVELAND Office: 916–917 Swetland Bldg.

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"NORMA" PRECISION BALL BEARINGS

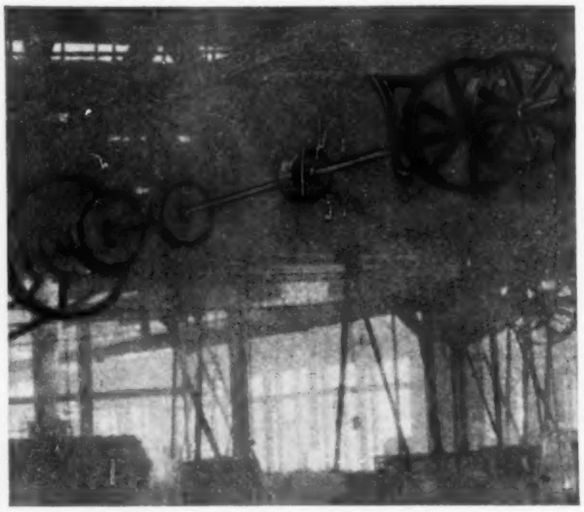
(PATENTED)

A dominant position in any field may be attained by salesmanship plus quality. But to maintain that position, quality must fight alone. For a decade past, "NORMA" Bearings have been the acknowledged standards in the field of small, high-speed, high-duty, silent-running machinery. Their dominating position has been repeatedly disputed—but their unvarying quality has maintained their leadership against all attacks.

See that your machines are "NORMA" equipped

THE NORMA COMPANY OF AMERICA
Anable Avenue
Long Island City
New York

Ball, Roller, Thrust and Combination Bearings



The Concern that Keeps Down Production Cost is Going to be Kept Busy

Sells Roller Bearings are guaranteed to lower power costs at least 10 per cent.

We are approaching a "buyer's market." Keep production cost at the lowest possible figure.

Now power cost enters largely into the price of your finished product.

Reduce it at least 10 per cent. Install Sells Roller Bearings in place of the old power wasting kind. They are installed overnight—Put up without taking down or stripping the shafting or changing the frames.

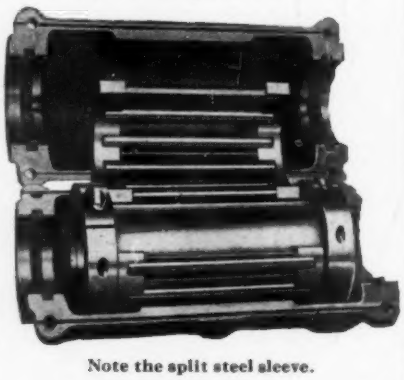
We call your attention in particular to the split steel sleeve feature of Sells Roller Bearings. This sleeve covers the gullies and ridges worn in the shafting by the old bearing. It also protects the shaft from future wear. It's an exclusive Sells feature.

The Sells Man will call. We will also send our book "Anti Friction Power Transmission."

John D. Sells
Manager

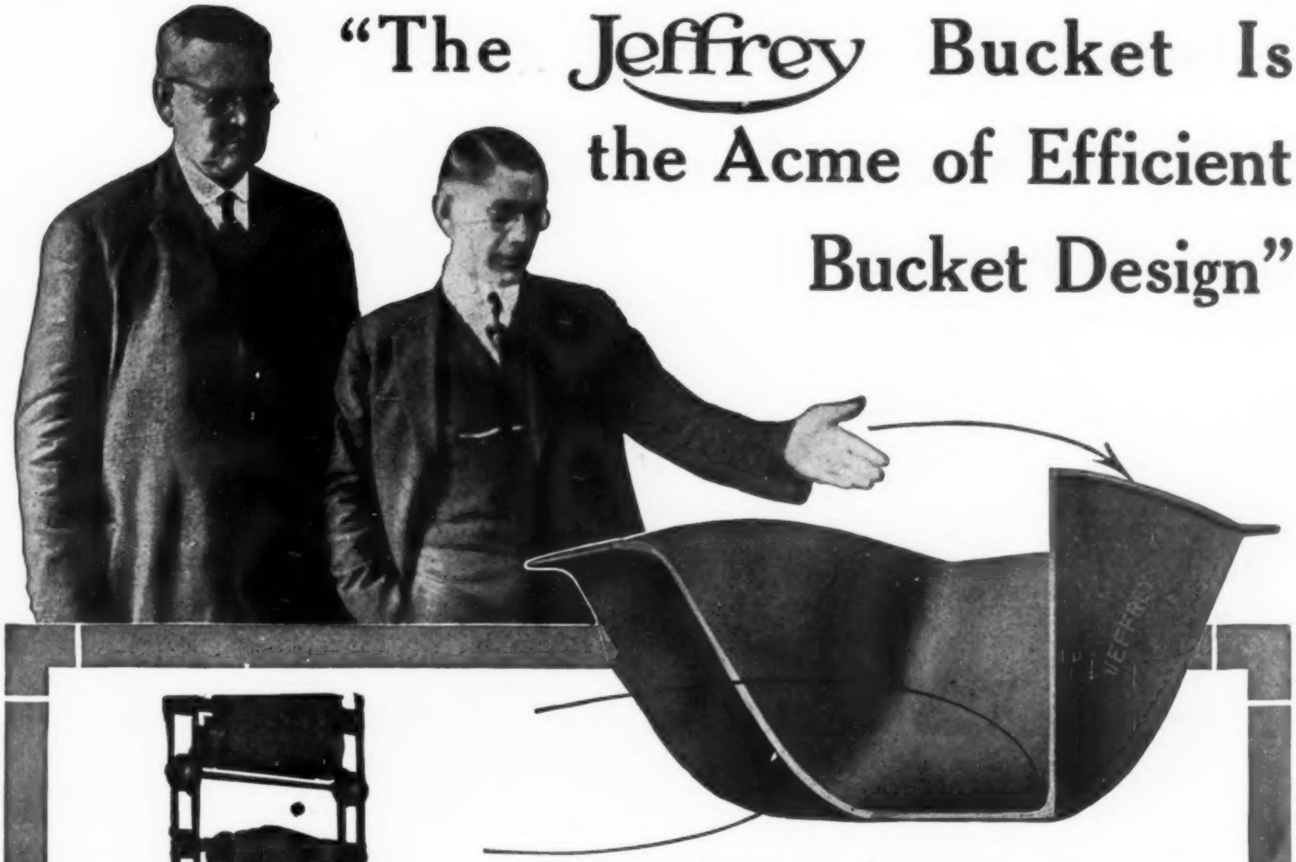
Royersford Foundry & Machine Company
60 N. 5th Street, Philadelphia, Pa.

We have letters from nationally known concerns who have installed Sells Roller Bearings. Included are **Gillette Safety Razor Company; French, Shriner & Urner Company; The Millers Milling Company; United Shoe Machinery Company; Aunt Jemima Mills Company and Dodge Brothers.** We'll send these letters.



Note the split steel sleeve.

"The Jeffrey Bucket Is the Acme of Efficient Bucket Design"



AMONG the many improvements of the new JEFFREY Carrier, there is probably none that has been more vital to the remarkable success of this carrier than the Efficient Bucket Design.

The Bucket outline gives the greatest capacity for complete discharge of materials, with minimum shock to the Conveyor as a whole, and with minimum wear to the Buckets hardened Tripping Cams.

This Bucket section plainly shows surfaces, edges and corners which have been reinforced where long experience has dictated. You'll notice, too, that there are no obstructing rods running across the buckets.

Catalog No. 210-N completely describes the JEFFREY Carrier. Write for your copy today.

The Jeffrey Mfg. Company
904 North Fourth Street, Columbus, Ohio

Branch Offices:

New York	Scranton	Los Angeles	Dallas
Boston	Pittsburgh	Charleston	Milwaukee
Philadelphia	Cleveland	St. Louis	Denver
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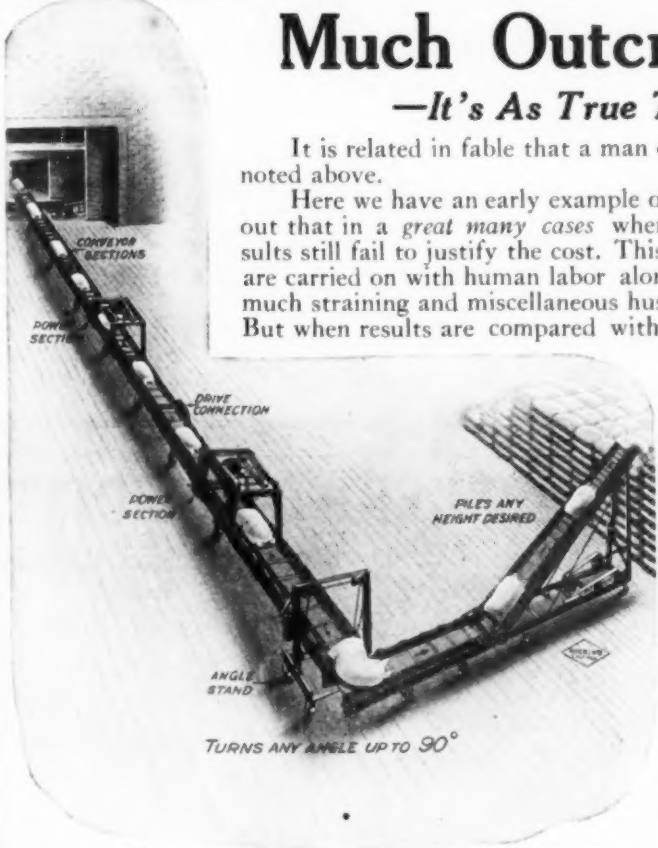
Handle it Mechanically

Much Outcry—Little Wool!

—It's As True To-day As It Was Then



From car to pile—or reverse. Making 90° angle turn. Only *two men* necessary.

It is related in fable that a man once tried to shear a pig—with the net results noted above.

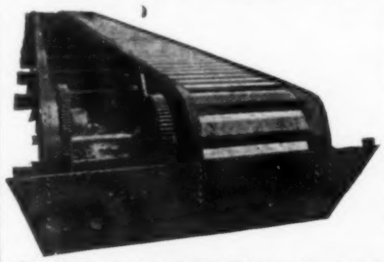
Here we have an early example of the misapplication of energy. It may be pointed out that in a *great many cases* where much energy is actually expended, the results still fail to justify the cost. This is notably true where large handling operations are carried on with human labor alone. There is the appearance of much motion, much straining and miscellaneous hustle bustle. It all looks like your money's worth. But when results are compared with those obtained from using modern conveying equipment it is *not* your money's worth. You are getting the outcry—but little wool.

Tests made on one installation of Robbins Portable Conveyors showed that it took a box, barrel, or bag only one minute and forty seconds to travel 165 feet to where it was piled in place. With bags following 3 feet apart this means that a bag would be delivered every two seconds—*or 30 bags per minute.* And it follows that the rate of delivery would be the same for equipment of any length. The installation works as many hours as you want it to without thinking of striking, and it's there *today, tomorrow and next year.*

Consult us for a plan whereby you may do your conveying at the greatest conservation of cost.

ROBBINS ENGINEERING COMPANY
390 Old Colony Building
CHICAGO U. S. A.

CALDWELL CONVEYORS



Belt Conveyors
Pan Conveyors
Apron Conveyors
Screw Conveyors
Scraper Conveyors
Cable Conveyors

H. W. CALDWELL & SON CO.
Elevating, Conveying and Power Transmitting Machinery
CHICAGO - - - - - 17th St. and Western Ave.
NEW YORK - - - - - - - 50 Church St.
DALLAS, TEXAS - - - - - - - - 711 Main St.
3

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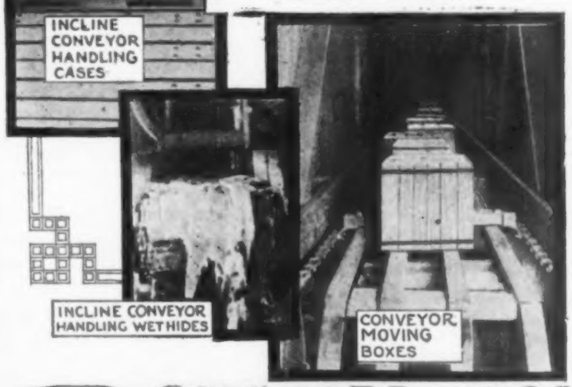
G-W Equipment

will handle your material in less time and save money for you.

It makes no difference whether your material is in bulk or in containers, there is a G-W conveyor to handle it economically. G-W Equipment will handle anything and deliver it where you want it. No matter how complex your problem may be, we can solve it.

Consult us on your special requirements whether they are for new or old plants.

Get the G-W Catalog—Send for it today.



Mechanical Handling in all lines of Industry

Gifford-Wood Co.
MAIN OFFICE AND WORKS Hudson, N. Y.
NEW YORK, BUFFALO, BOSTON, CHICAGO

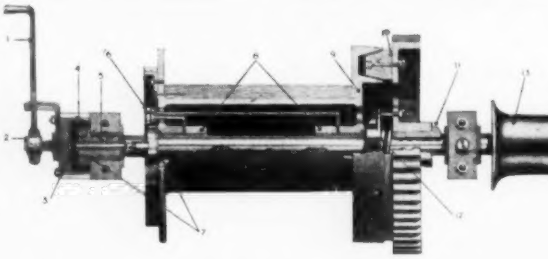
YOU CAN BLOW SHAVINGS AND HOGGED CHIPS 4,000 FEET

with a

LONG DISTANCE CONVEYOR SYSTEM

We install and guarantee operation

The ALLINGTON & CURTIS MFG. CO.
Incorporated 1888
GENERAL OFFICES AND WORKS: Saginaw, Mich.
BRANCH OFFICES AND WORKS: So. Boston, Mass. Chicago, Ill.; Rochester, N. Y.; Philadelphia, Pa.



What the Clyde Thrust Mechanism Means to You

NO part of a Hoist is more important than the *Thrust Mechanism*, and upon its unfailing operation depends the service rendered on your jobs.

Note the points listed below

1 Forged thrust lever
2 Large head to avoid slippage
3 Renewable special bronze point
4 Oil collar thrust nut
5. Tool steel pin and cross key
6 Accessible grease cups for both ends of drum
7 Bronze liners on larger sizes
8. Long bronze bushings
9. Lagging pocket
10. Smooth turned hard maple friction blocks, grain circumferential
11. Gear pressed against gib head tapered key to prevent lateral motion
12. Bridled spring to release drum from friction
13 Large turned winch head

CLYDE IRON WORKS SALES COMPANY
DULUTH, MINNESOTA, U. S. A.
Sole Distributors for Clyde Iron Works

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The Morgan Engineering Co.

ALLIANCE, OHIO

Largest Builders of

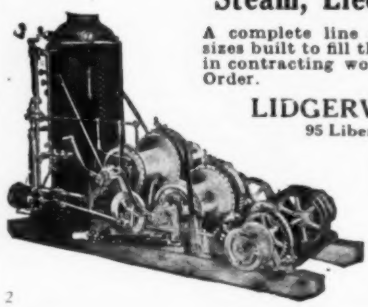
Electric Traveling Cranes

in the World

We also design and build Steel Plants complete, Hammers, Presses, Shears, Charging Machines and all kinds of Rolling Mill and Special Machinery.

LIDGERWOOD HOISTS

Steam, Electric, Gasoline



A complete line of standard types and sizes built to fill the severe conditions met in contracting work. Special Hoists to Order.

LIDGERWOOD MFG. CO.
95 Liberty St., New York
Philadelphia
Pittsburgh Chicago
Los Angeles Seattle
London

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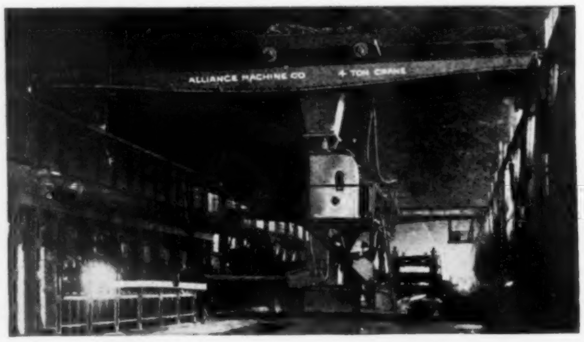


Economical ***Durable***

"ALLIANCE" Crane Type
Billet Charging Machine

Cut shows a machine designed to charge billets and slabs into and draw them from reheating furnaces. It will pick up a slab from any position on the floor and charge it into the furnace.

SEE OUR DATA IN 1920 ASME CONDENSED CATALOGUES OF MECHANICAL EQUIPMENT

9

PITTSBURG *The Largest ... of the World's Largest Cranes* NEW YORK
THE ALLIANCE MACHINE CO.
ALLIANCE, OHIO.
BIRMINGHAM ENGINEERS AND BUILDERS CHICAGO

Perforated Metal Screens

in

Steel, Copper, Bronze, Brass, Lead, etc.

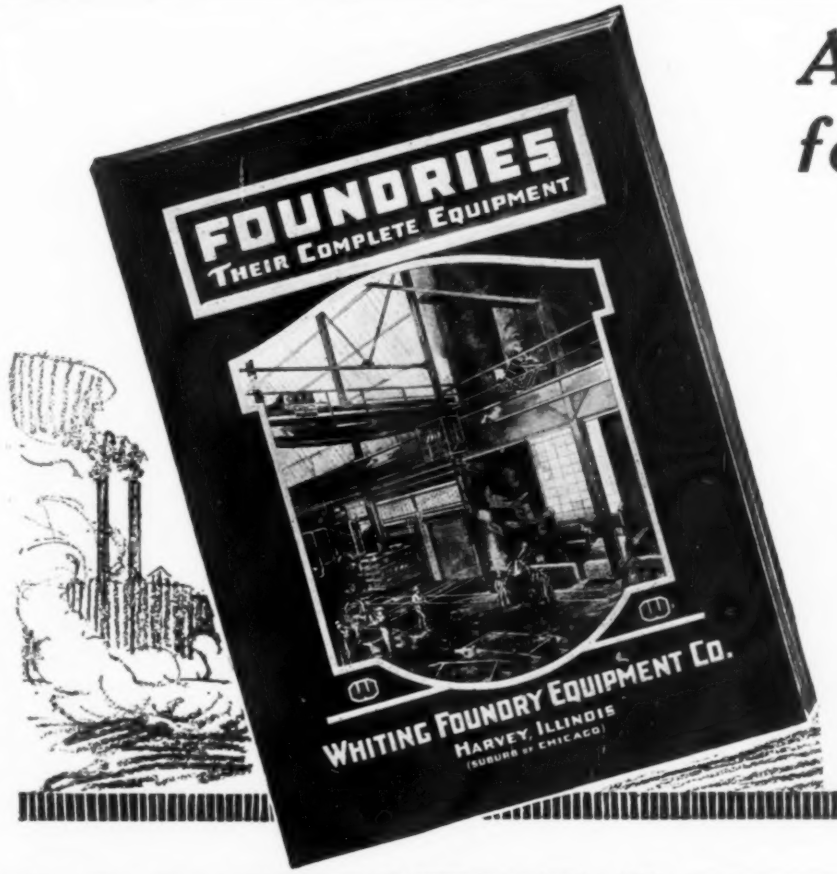
for all purposes

ELEVATOR BUCKETS

PLAIN AND PERFORATED

General Sheet and Light Structural Work

HENDRICK MFG. CO.. Carbondale, Pa.
New York Office, 30 Church Street



A Useful Book for Engineers

This 52-page book can be a big help to Engineers in designing foundry plants. Along with a description of the essential requirements for economical production, it contains typical layouts of grey iron, car wheel, steel and malleable shops with lists of equipment recommended. Fully illustrated.

Send for your copy.

WHITING CORPORATION

Western Office & Works: Harvey, Ill.
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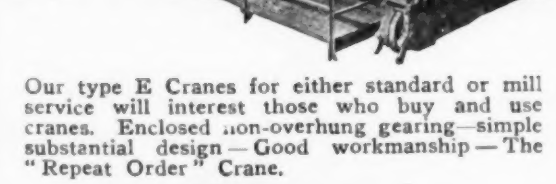
NORTHERN CRANES



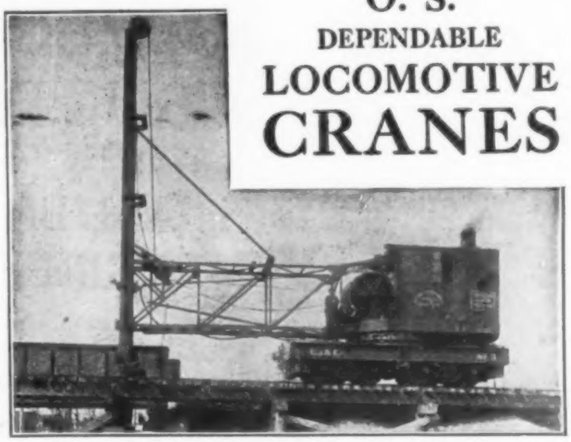
Our type E Cranes for either standard or mill service will interest those who buy and use cranes. Enclosed non-overhung gearing—simple substantial design—Good workmanship—The "Repeat Order" Crane.

(Also Electric Hoists)

NORTHERN ENGINEERING WORKS
DETROIT MICHIGAN ~ U.S.A.

One of the numerous types of

O. S. DEPENDABLE LOCOMOTIVE CRANES



OUR type of 30-ton crane with special equipment of pile driver leads is so arranged that the boom may be replaced by horizontal trusses carrying steel collapsible leaders. When these pile driver leaders are lowered to the horizontal position crane is in standard clearance of 15 feet.

With the efficient system of outriggers provided the crane makes a very serviceable wrecker having capacity of 60 tons at short radii. Complete locomotive and freight car air brake equipment is supplied.

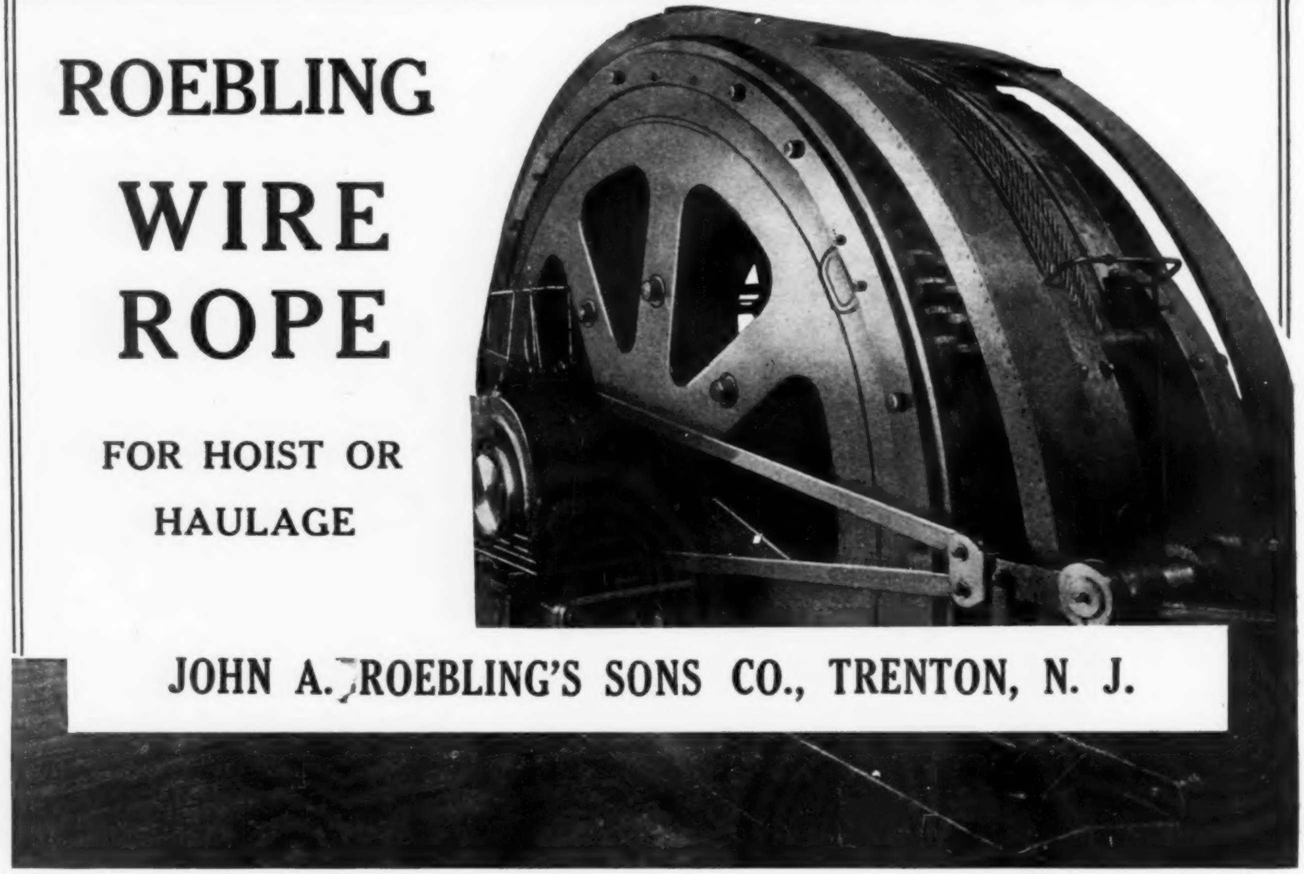
Catalogue No. 16 describes many other types

Orton & Steinbrenner Co.

Main Office: CHICAGO, ILL.
6 **Factory: HUNTINGTON, IND.**

ROEBLING WIRE ROPE

FOR HOIST OR HAULAGE



JOHN A. ROEBLING'S SONS CO., TRENTON, N. J.

SPECIALIZED CONSULTING SERVICE

in ALL BRANCHES of the ENGINEERING FIELD

The cards of Consulting Engineers appearing on pages 118, 119, 120, 121 and 122 of this issue serve as an index to professional service in the mechanical field. Specialized service may be obtained through this section on such subjects as

Power Plants
Plant Construction
Power Transmission
Steam Turbines
Combustion
Water Purification

Refrigeration
Centrifugal Pumps
Heating and Ventilating
Air Conditioning
Industrial Processes
Production

Time Study
Inspection
Testing
Appraising
Management
Cost Systems

Machine Design
Special Machinery
Textile Machinery
Tool Designing
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Engineers are
Increasing the Production

in many factories by installing Sedgwick Hand Power Elevators, Gravity Drops, or Dumb Waiters.

Speed of transportation from floor to floor, without the expense of power outfits is secured—and the higher priced labor of today is thereby enabled to increase production.

Our catalogue shows many types for various conditions, and our long experience as specialists in this line will assist the engineer in making proper specifications. We often suggest new combinations of units to fit special needs.

Write us regarding your problems, and profit by our experience of a quarter century in this special field.

Catalogue and Service Sheet on request.

SEDGWICK MACHINE WORKS

Specialists for twenty-five years

162 West 15th Street New York

The Engineering Societies Library

ONE of the largest collections of engineering literature in the world is that found in the Engineering Societies Library, 29 West 39th Street, New York.

It comprises 115,000 volumes, including many rare and valuable reference works not readily accessible elsewhere. Over 1,100 technical journals and magazines are regularly received, including practically every important engineering journal in the civil, mechanical, electrical, and mining fields.

The library is open from 9 a.m. to 10 p.m., with trained librarians in constant attendance. Its resources are at the service of the engineering and scientific public.

The Eastern Machinery Co.

NEW HAVEN, CONN.

MANUFACTURERS OF

Electric and Belt Power Passenger and Freight Elevators

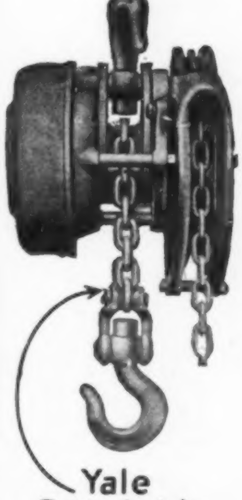
Hoisting Machines, Friction Winding Drums

Friction Clutches and Friction Clutch Pulleys

TRADE YALE MARK

YALE MADE IS YALE MARKED

Detachable Shackle Gives Safety and Economy



Yale Detachable Shackle

THE YALE Safety Hook on the steel load chain of a YALE Spur-Geared Chain Block is *not* welded on. It has a detachable shackle.

This eliminates the danger of a hand-welded shackle link, and more—

The large steel shackle pin is quickly removable, and the hook may be changed or the chain lengthened without removing the chain from the block.

"From hook to hook a line of steel," YALE Chain Blocks are safe and save labor.

The Yale & Towne Mfg. Co.

Makers of the Yale Locks

Stamford Conn.

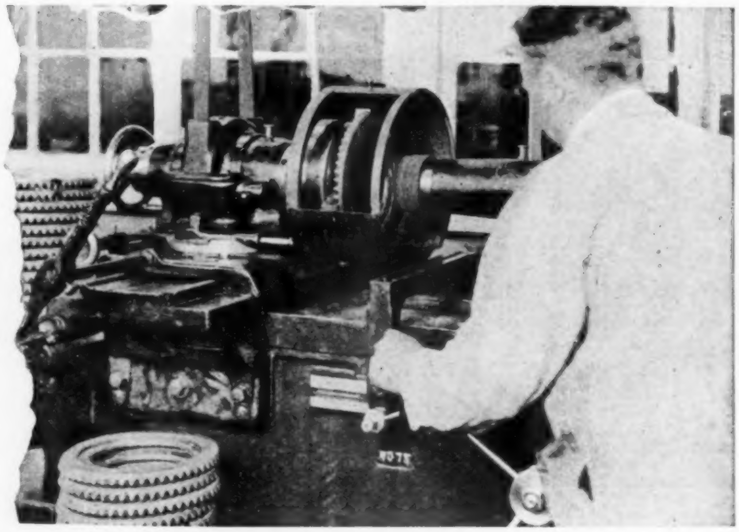
SPUR-GEARED BLOCK

MECHANICAL ENGINEERING

November, 1920 **CARD INDEX** **Vol. 42, No. 11**

HEALD will Hole and Face Grind
at same setting

Shown is a style No. 75 equipped with a cross slide workhead. The adjustment of this special workhead allowed for quick horizontal movement when the head was drawn from the hole to grind the face. The stock on the holes ran from .020 to .030 and were $^3/_8$ wide, finishing $6\text{-}^1/_2''$ in diameter. The face needed about .010 to clean and was $^7/_8''$ wide. The tolerance was plus .002 and Heald turned them off at one minute, fifty seconds each.



There are hundreds of Internal Grinding problems. Let us solve yours.

THE HEALD MACHINE CO.

41 New Bond St., Worcester, Mass.

The ETTCO

Hand-Operated—Self-Tightening
DRILL CHUCKS

EASTERN TUBE & TOOL CO.
594 Johnson Ave., Brooklyn, N. Y.

DON'T LET DOWN THE BARS!

Mr. H. C. of L. is on the run—but BEWARE!
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Avoid waste of time, money and material—it is the only way to keep prices on the downward trend.

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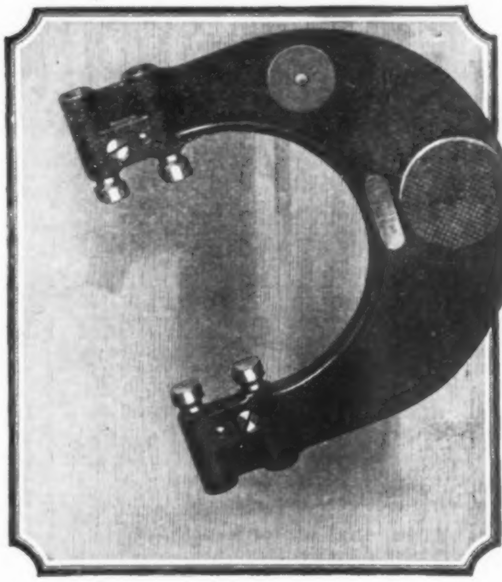
WHY THE "SNAP" *in a* SNAP GAGE

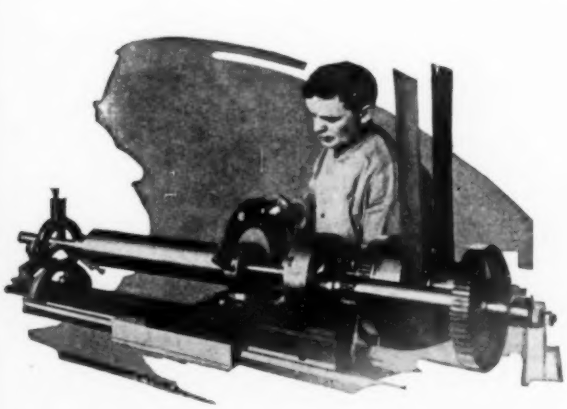


THE meaning of the word "snap" as applied to limit gages of this type refers primarily to the way in which the gage is used when inspecting cylindrical work. Owing to the extra large tool steel gaging plugs with their beveled edges, this snap is especially evident when the inspector is using a Johansson Adjustable Limit Snap Gage. An operator has only to operate a Johansson Gage for a short time in order to appreciate how nicely it snaps over the work.

"SNAP" number two is a most valuable one and applies to the breaking of the cast-iron gage frame. Johansson Snap Gages will not bend, warp or spring if they are dropped. Instead, the cast iron will SNAP—the operator thus being prevented from using a gage which is inaccurate and passing spoiled work which will cause untold damage later on.

THE "snap" which perhaps appeals the most to the user of a Johansson Limit Gage of this type is represented by the slang meaning of the word. It is undeniably a "snap" to set, to maintain the accuracy and to use a Johansson Snap Gage. When it becomes necessary to reset the size on the Go and No Go plugs, this can be easily done by means of the adjusting screws which are securely held in their correct position by the action of the clamping screws which force the plugs to seat securely against the adjusting screws. The accuracy is then insured permanent by the sealing wax placed over the adjusting screws.

NOT only does the insulated grip protect the gage from change in size owing to temperature, but it also makes the use of the gage hour after hour a "snap" for its location is such that the gage is always nicely balanced when so properly held.



IN short it is a "snap" to manufacture by the limit system when Johansson Gages are used. Why not let them prove it in your own shop?

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SHEETS AND BARS

STEEL

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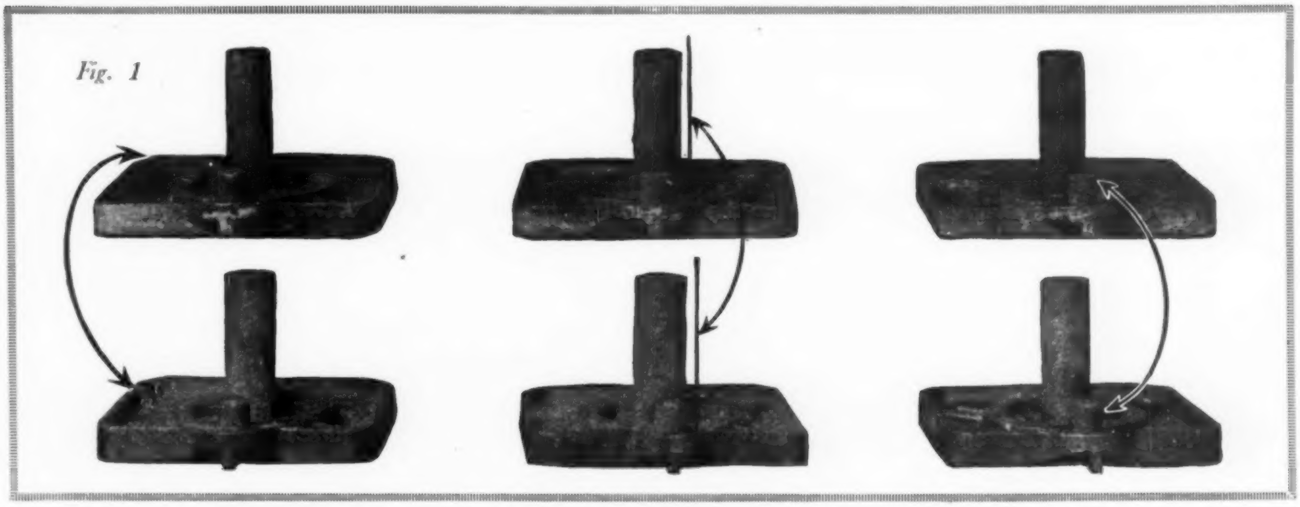
Fig. 1



Lower costs attained by elimination of unnecessary machining

NO detail of machine-shop work holds the eye of the inexperienced visitor more absorbingly than the spectacle of a machine as it gouges off deep bites of metal from a casting. Compute the cost of the machinist's time, lump in the proper overhead for the machine and floor-space, and then add the cost of waste metal and it becomes quickly apparent how expensive a form of entertainment this can be.

Every unnecessary cut is pure waste.

It represents a mistake in the selection of castings.

On this page are shown in photograph and diagram exact reproductions of castings taken from actual practice which illustrate the waste resulting from inferior castings.

The upper row in the photographic illustration above (see Fig. 1) shows a series of castings produced by machine moulding. Below is the same casting in series as made from hand-made moulds. Even in reduced reproduction the contrast between the non-uniform hand-made casting and the uniformly regular machine-made casting is easily apparent. (No effort was made to make a favorable selection of the machine-made castings.)

As the lower group of castings came to the machine shop for layout, each casting was a separate problem to the layout man. He was compelled to locate holes off center on bosses—and do many other undesirable things to make his principal cuts come uniform—or at all. Contrast this with the upper group of castings—"as like as peas in a pod"—the layout man's difficulties disappeared — repetition makes fast work easy.

Furthermore, in the case of the hand-made casting the shell of pad metal not only bulks greater but its thickness varies greatly. So great is this variation that frequently such castings, although they appear to the eye as O. K., are dangerously near being defective because there is no margin of metal between the surface of the rough casting and the specified dimension of the finished surface. When "hollows" penetrate even $\frac{1}{32}$" too deep, no choice then remains except to scrap the casting and charge to "Expense" the labor performed on it before the discovery.

The irregularity of the hand-made casting, when compared with the even, uniformly shallow depth of waste metal on the machine-moulded casting, makes clear at a glance the greater rapidity and uniformity possible in machining the latter.

Machine-moulding in the best machines can be accurately controlled within $\frac{1}{16}$ inch per inch of pattern draw. This degree of accuracy, backed by the fact that the machine-made mould is free from non-porous spots caused by hand-patching and slicking, insures the remarkable uniformity here pictured.

Based on this uniformity (and impossible without it),

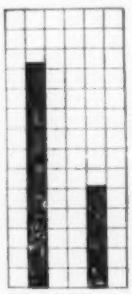


Figure shows an average of comparative costs furnished by scores of machine shops before and after the adoption of machine-made castings.

Fig. 2

wholesale economies can be effected in machine-shop practice where large scale production is the goal. *First* comes the sweeping economy in lay-out time where one laying-out of a job serves as the only basis required for repetition day after day of the same cuts on castings which are themselves uniform. *Second* comes the saving in cutting time, due to reducing the shell of waste metal to a minimum. Compute the saving of only a single cut less across each face of a casting and then multiply it by the number of castings handled per day and you gain a partial picture of the resulting yearly economy. The *third* economy results from the closely-held accuracy of the machine-made casting which virtually eliminates defective castings, and cancels the previous losses due to waste machining on defective castings—a decrease of 71% in defectives is the average result of the change to machine-made castings.

The sum of all these economies is graphically illustrated in Figure 2 which shows how the machining costs dropped in a large group of shops which adopted the machine-made casting.

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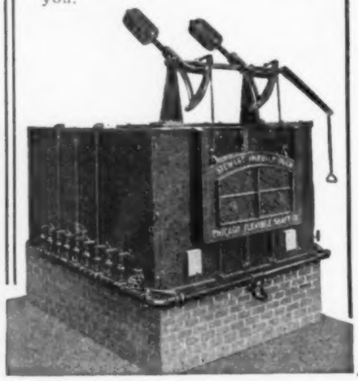
For Annealing, Carbonizing, Heat Treating, etc.

Preferable where the heat treating room has been determined, and location of furnaces is permanent. The walls are heavier, special insulating brick made a part of the construction, and the base more substantial.

Complete drawings and specifications for seventeen stock sizes, ranging from 12" x 24" opening, 60" depth, to 18" x 36" opening, 120" depth. Other sizes built to specifications.

Stewart "inbuilts" are delivering efficient daily service in many of the largest manufacturing institutions in America. If they're good enough for those whose reputation and prosperity depend on quality products, they're good enough for you.



No one knows better than a member of the A. S. M. E. the importance of absolute certainty and accuracy. Particularly is this true of heat treating, since upon its accuracy depends the efficient service of many a manufactured article.

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Three stock sizes. Prices and complete specifications on request.

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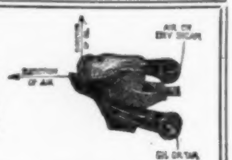

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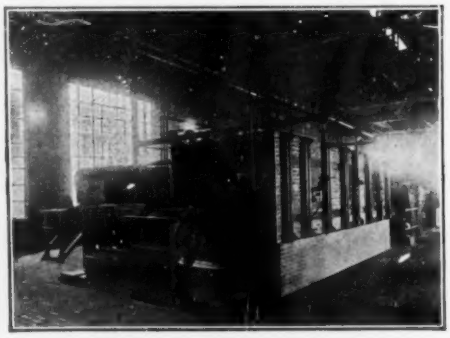

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The war taught Stewart to produce small die cast parts by the million—quicker, better and cheaper.

Stewart die-castings are accurately made. Small holes are perfect and in line. Gear teeth and threads are well shaped.

They are made of the right metal for the job.

No machining is required. They are finished when they come from the die.

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—while production waits

WHENEVER a fuse blows, production is stopped.

Then, while a workman hunts up an electrician and the electrician tests for the blown fuse, the motor, the motor-driven machinery, and a little knot of workmen go on a short vacation.

Fuse hunting takes more time than most people realize. Time it yourself in your own plant. You will find that the average time required to locate and replace a blown fuse is twelve minutes.

With the Condit Type N 1 Oil Motor Starter, fuse hunting is never necessary. This switch does not protect by fuses. In the event of overload, short-circuit, undervoltage or single phase running, the ball-bearing latch is tripped automatically and the contacts are opened under oil.

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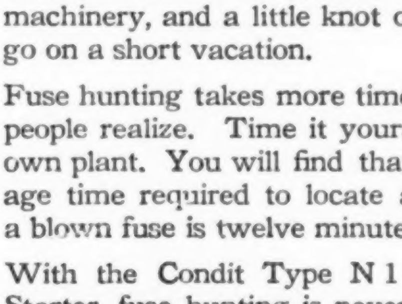

Condit Type N-1 Oil Motor Starter 30 Amperes 600 Volts.

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In Effect January 1, 1921

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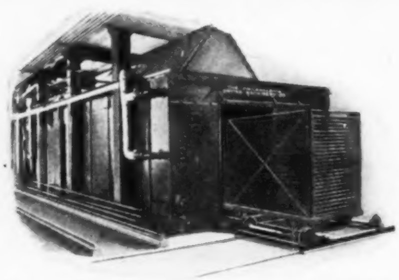

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Service	Durable, well built machinery that gives assurance that plant can be continuously operated.
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Uniform Drying	Produces a uniform product of uniform quality.
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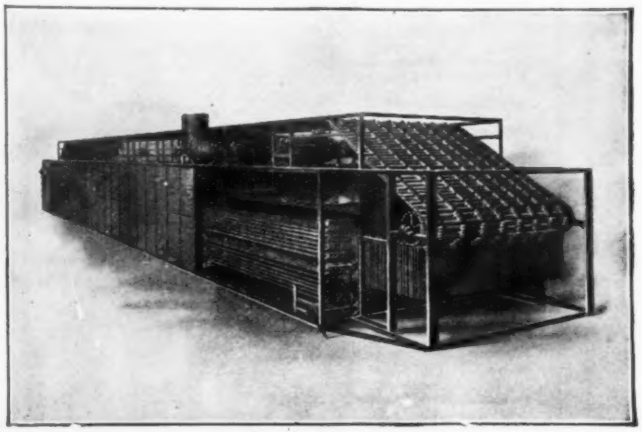

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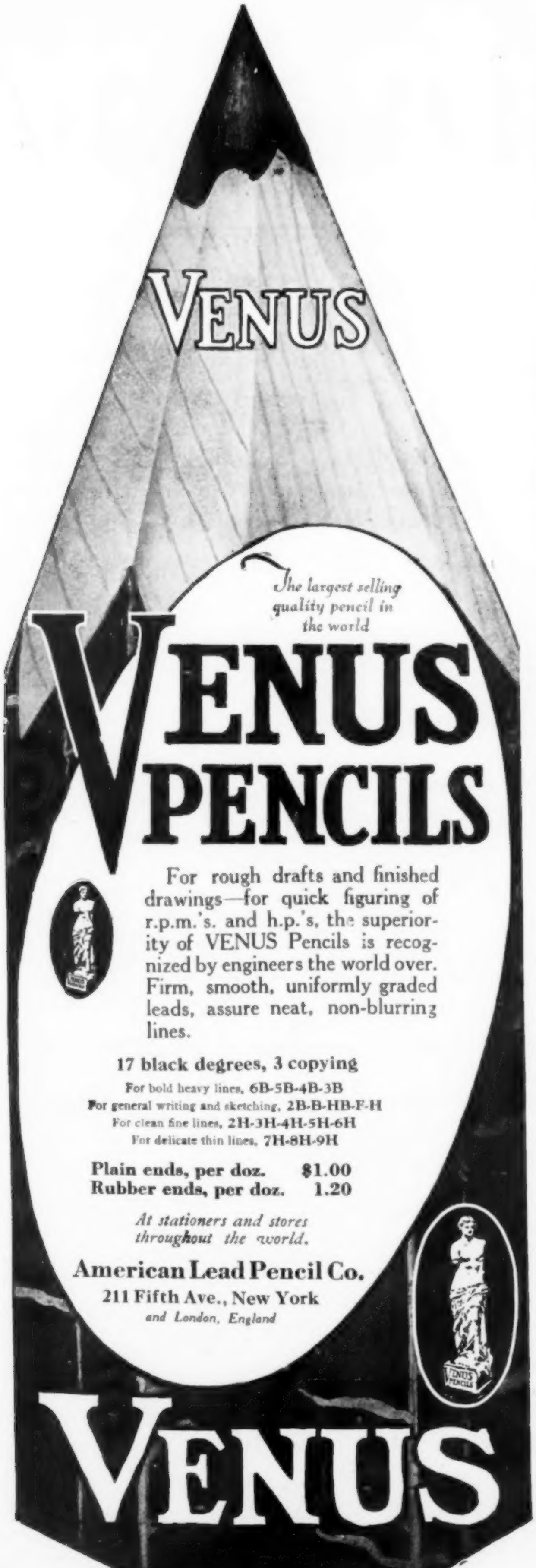

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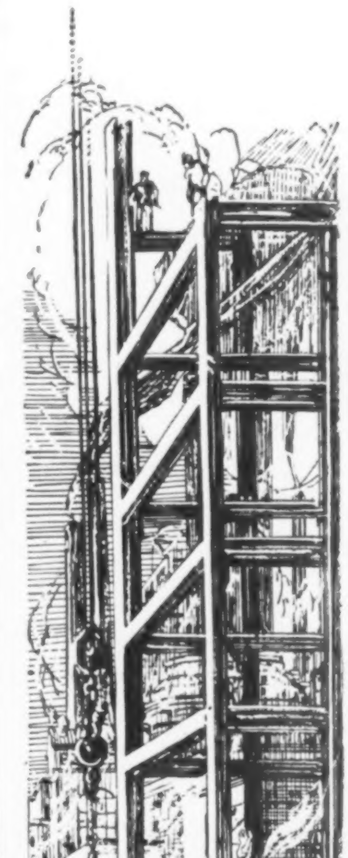

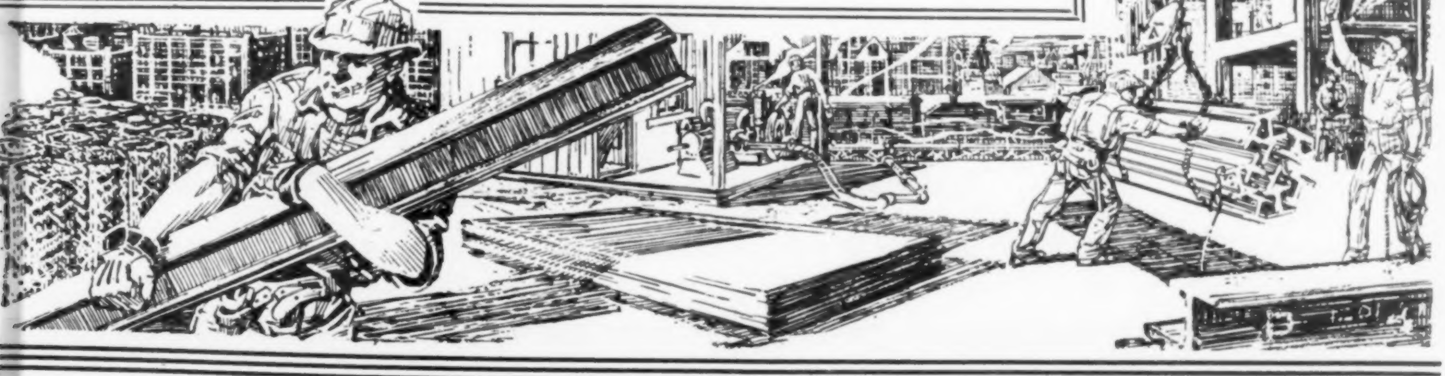

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The American Society

Time and Place

The 1920 A. S. M. E. Annual Meeting will be held as usual at the Engineering Societies Building, New York City, from December 7th to December 10th inclusive.

Program

The Keynote Session will be devoted to a broad and constructive consideration of our National Transportation Problem; during the course of which the most prominent authorities in the country will discuss the subject from the respective standpoints of Railroads, Feeders, Motor Trucks, Waterways, and the Terminal Problem of New York City

Other important sessions will be devoted to discussions of Industrial Management, Fuels, Woodworking Machinery, Machine Shop Practice, Railroad Equipment, Mechanical Design, Scientific Research, etc.

A. S. M. E. Annual Meeting Report

A complete and accurate report of this meeting will naturally be of great interest to the 13,000 members of the Society, as well as to those other thousands of engineers and industrial executives who have registered their interest in its constructive activities by subscribing for its monthly journal, *Mechanical Engineering*.

A. S. M. E. Annual Meeting Number

Mechanical Engineering for January, 1921, will contain a full report of the entire meeting; and will be read with keen appreciation by all who attend, as well as by those whose business affairs prevent their attendance, and who are thereby compelled to depend upon it for an authoritative account of the many important facts that will be brought out.

Each month *Mechanical Engineering* contains the advertising of leading manufacturers in practically all divisions of mechanical equipment. Many of these advertisers increase their space for the January issue, while many other manufacturers who do not use space regularly recognize the extra importance of this

MECHANICAL

29 West 39th Street

industries, who specify or otherwise influence mechanical equipment

the forthcoming Annual Meeting of

of Mechanical Engineers

number, and arrange for special representation therein. Both in point of editorial interest, and in the volume of advertising carried, it is always the most noteworthy issue of the year.

Circulation

The rapidly growing circulation of *Mechanical Engineering* now exceeds 17,000 a month, while additional demands for the January number will require us to print a total of at least 18,000 copies. This circulation represents in one grouping the largest number of prominent engineers identified with the selection and purchase of mechanical equipment ever recorded as readers of a monthly engineering publication.

We Can Help Prepare Your Advertisement

Our Copy Service Department is composed of men who combine advertising experience with an accurate knowledge of engineering matters, and they will be glad to coöperate in preparing copy which shall insure a satisfactory representation for your firm. Upon request, a complete advertising suggestion will be submitted for your consideration.

What Space Costs

Rates for single insertions of new advertisers in the January issue will be as follows:

Full page	$115.00
Half page	62.00
Quarter page	33.00

(Annual rates on application)

Adequate listings of products in the Classified Index are included if order is received in time to permit of the necessary rearrangements of the Index.

Closing Date—December 6, 1920

Because of the increased size of both editorial and advertising sections in the January number we cannot promise to submit proof on any copy received after December 6. Earlier copy will naturally secure more careful attention than that received at the last minute. Please make your reservation promptly and let us have copy and cuts as soon as possible thereafter.

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McClintock & Craig

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Harris, Latter & Co.

Automotive
Halbfass, Arnold J. (Switzerland)
McMurtry, Alden L.
Manly & Veal

Ballistic Problems
Birnie, Hawkins & Watson
Webster, Alfred Gordon

Bankers Reports
Birnie, Hawkins & Watson

Brokers in Engineering Business
Engineering Business Exchange

Building Equipment
Jellett, Stewart A. Co.

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Engineering Business Exchange

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Harris, Latter & Co.

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Rice & Bashore
Simsohn, Julian S.
Wayte, W. J.

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Northern Engrg. Co.

Combustion
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Cary, Albert A.

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Exporters' Technical Association (London)

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Kidde, Walter & Co.
Stone & Webster

Consultation
Simsohn, Julian S.

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Estes, L. V. (Inc.)
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Naumburg, Robert E.
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Wilhelm, J. H.

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Keller, Joseph F.

Dies
Keller, Joseph F

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Kidd, Andrew, Jr.
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Verhey, Hubert C.

Equipment
Colwell, James V. V.

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Meyer, Strong & Jones

Examinations & Reports
Arison, Goodwin & Knapp
Crowell, H. W.
Main, Chas. T.

Experimental
Kaighn, Herbert E.

Factories

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Meron, Frederick

—Equipment Installation
Schlank, Elias

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—Electrical Equipment
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See pages immediately preceding.

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Classified advertisements in MECHANICAL ENGINEERING are inserted at the rate of 30 cents a line; 15 cents a line to members of A.S.M.E. Eight words to the line average. Minimum insertion charge, 5 line basis; maximum 20 lines. No display matter carried. ***Copy must be in hand not later than the 6th of the month preceding date of publication.***

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FOR ALPHABETICAL LIST OF ADVERTISERS, SEE PAGE 142

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(See Tramways, Wire Rope)

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(See Compressors, Receivers, etc., Air)

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Blowers, Turbine
Brinckerhoff, H. Gordon Co.

Blueing
* American Metal Treatment Co.

Boards, Drawing
New York Blue Print Paper Co.

Boiler Compounds
(See Compounds, Boiler)

Boiler Coverings, Furnaces, Tube Cleaners, etc.
(See Coverings, Furnaces, Tube Cleaners, etc., Boiler)

Boiler Fronts
* Budd Grate Co.

Boiler Settings, Steel Cased
* Casey-Hedges Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Boilers, Heating
Herbert Boiler Co.
* Smith, H. B. Co.

Boilers, High Pressure
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Edge Moor Iron Co.
* Heine Safety Boiler Co.
* Keeler, E. Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boilers, Internal Furnace
* Bigelow Co.
* Casey-Hedges Co.
* Leffel, James & Co.
* Springfield Boiler Co.

Boilers, Locomotive
* Bigelow Co.
* Casey-Hedges Co.
Clyde Iron Works
* Erie City Iron Works
* Lidgerwood Mfg. Co.

Boilers, Marine
* Babcock & Wilcox Co.
* Casey-Hedges Co.
Sun Shipbuilding Co.
* Walsh & Weidner Boiler Co.
* Ward, Chas. Engineering Co.

Boilers, Return Tubular
* Bigelow Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Springfield Boiler Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Co.
* Wickes Boiler Co.

Boilers, Vertical Tubular
* Bigelow Co.
* Casey-Hedges Co.
Clyde Iron Works
* Cole, R. D. Mfg. Co.
* Leffel, James & Co.
* Lidgerwood Mfg. Co.
* Walsh & Weidner Boiler Co.

Boilers, Water Tube
* Babcock & Wilcox Co
* Bigelow Co.
* Casey-Hedges Co.
* Edge Moor Iron Co.
* Erie City Iron Works
* Heine Safety Boiler Co
* Keeler, E. Co.
Schofield's, J. S. Sons Co.
* Springfield Boiler Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Ward, Charles Engineering Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Bolt Cutters
(See Cutters, Bolt)

Bolts, Stove
* Reed & Prince Mfg. Co

Boring Machines
* Niles-Bement-Pond Co

Boring Tools
(See Tools, Boring)

Brake Bands
* Worcester Pressed Steel Co.

Brake Blocks
* Johns-Manville, H. W. Co.

Brewers' and Bottlers' Machinery
* Vilter Mfg. Co.

Brick, Fire
* Crescent Refractories Co.
* Jointless Fire Brick Co.
* King Refractories Co. (Inc.)

Bridge Tramways
(See Tramways, Bridge)

Bronzes, Bearing
American Bronze Corp'n
* Johnson Bronze Co.

Buckets, Elevator
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
* Jeffrey Mfg. Co.
* Jones, W. A. Foundry & Machine Co.
* Link-Belt Co.
* Willcox Engineering Co.

Buckets, Grab
* Brown Hoisting Machinery Co.
Clyde Iron Works
* Lidgerwood Mfg. Co.
* Link-Belt Co.
Orton & Steinbrenner Co.
* Whiting Corp'n

Buckets, Self-Dumping
* Brown Hoisting Machinery Co.
Clyde Iron Works
* Link-Belt Co.
Orton & Steinbrenner Co.
* Whiting Corp'n

Burners, Gas
* Rockwell, W. S. Co.

Burners, Oil
* Best, W. N. (Inc.)
Hammel Oil Burning Equipment Co.
* Lockett, A. M. & Co. (Ltd.)
* Rockwell, W. S. Co.
* Schutte & Koerting Co.
* Spray Engineering Co.

Burners, Powdered Fuel
* Quigley Furnace Specialties Co

Bushings, Bronze
American Bronze Corp'n
* Budd Grate Co.
* Johnson Bronze Co.
* Wood's, T. B. Sons Co.

Cabinets and Tables, Blue Print
* Manufacturing Equipment & Engrg. Co.

Cable Railways
(See Railways, Cable)

Cable Rings, Aerial
Cameron Appliance Co.

Cable Wire
(See Rope, Wire)

Cables, Electrical
(See Wire & Cables, Electrical)

Cableways, Excavating
* Lidgerwood Mfg. Co.

Cableways, Hoisting and Conveying
* Lidgerwood Mfg. Co.

Calorimeters
* Precision Instrument Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co.

Cam Shafts
* Pollak Steel Co.

Car Hauls, Cable and Chain
* Jeffrey Mfg. Co.
* Link-Belt Co.

Carriers and Elevators, Freight
* Caldwell, H. W. & Son Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.

Cars, Freight Elevator
Eastern Machinery Co

Cars, Industrial Railway
* Link-Belt Co.

Casehardening
* American Metal Treatment Co.
* Chicago Flexible Shaft Co.

Casings, Steel (Boiler)
* Casey-Hedges Co.
* Vogr, Henry Machine Co.

Castings, Acid Resistant
* United States Cast Iron Pipe & Fdry. Co.

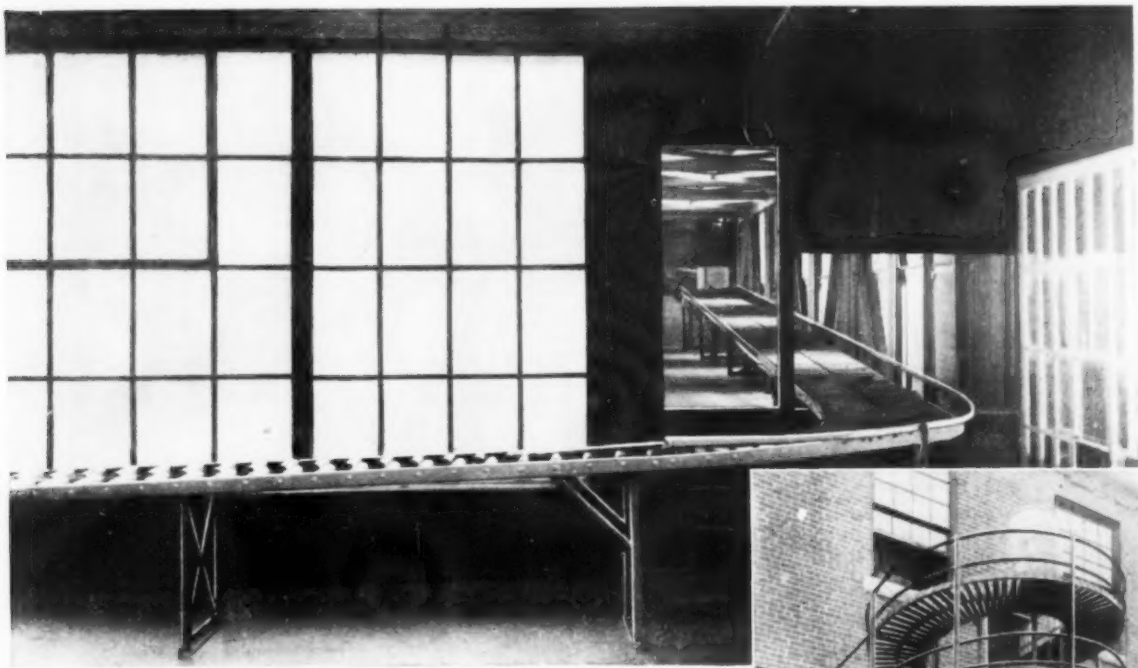
Castings, Aluminum
* Aluminum Co. of America

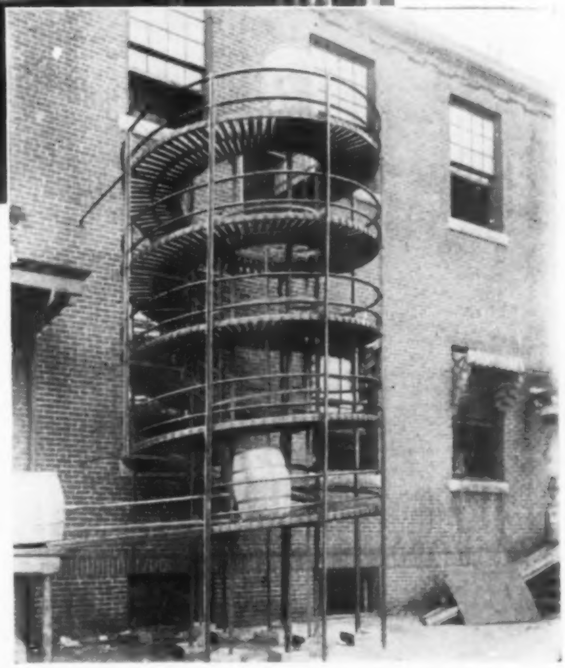
Castings, Brass and Bronze
American Bronze Corp'n
* Budd Grate Co.
* Homestead Valve Mfg. Co. (Inc.)
* Lunkenheimer Co.

Castings (Chill)
* McLain's Systems (Inc.)

Castings, Die-Molded
* Alemite Die Casting & Mfg. Co.

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1920 Volume*





Gravity—and Production Costs

THE two have a very real connection. Gravity will replace much of the power and labor that you now use for the many lugging and hauling jobs in your plant. It will carry your product through your plant from its beginning until it is delivered on the shipping platform.

The Mathews Gravity Conveyer will put this free power to work for you, cutting your handling costs, keeping your product on the move, without confusion and with a negligible expense for labor and power.

The Mathews Gravity Conveyers are built in all sizes, from the complex, built-in systems to the simple sectional one. They can be installed permanently or used sectionally, in doors or out. The ball bearing rollers are made of seamless, drawn steel that stands the gaff of the hardest usage.

Your lugging problem is not the exception. To employ gravity, it is not necessary that your plant be an entirely down-hill layout. One of our sales engineers will gladly talk it over with you. Our illustrated catalog contains a large variety of our latest installations. It has an interesting message for you, telling how gravity can cut your production costs. Write for it.

Whether it's boxes or bales, cases or cartons, barrels or buckets, bundles or bags, lumber or bricks, castings or pig, there's a Mathews Gravity Roller Conveyer System that our engineers can fit to your plant and needs—profitably.

MATHEWS GRAVITY CARRIER COMPANY
136 Tenth Street, Ellwood City, Pa.
Branch Factories: Port Hope, Ontario London, England

MATHEWS
SPEED ECONOMY
GRAVITY ROLLER CONVEYER

* Barnhart Bros. & Spindler
* Doehler Die-Casting Co.
Stewart Mfg. Corp'n
Veeder Mfg. Co.

Castings, Heavy
* United States Cast Iron Pipe & Fdry. Co.

Castings, Iron
* Brown, A. & F. Co.
* Budd Grate Co.
* Builders Iron Foundry
* Caldwell, H. W. & Son Co.
* Casey-Hedges Co.
* Central Foundry Co
* Cole, R. D. Mfg. Co.
* Falls Clutch & Machinery Co.
* Fuller-Lehigh Co.
* Hill Clutch Co.
* Homestead Valve Mfg. Co. (Inc.)
* Hooven, Owens, Rentschler Co.
* Jeffrey Mfg. Co.
* Jones, W. A. Foundry & Machine Co.
* Lidgerwood Mfg. Co
* Link-Belt Co.
* Lunkenheimer Co.
* Pittsburgh Valve Fdry. & Const. Co.
* Royersford Fdry. & Mch. Co.
Sun Shipbuilding Co.
* United States Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.

Castings, Semi-Steel
* Builders Iron Foundry
* Caldwell, H. W. & Son Co.
* Hill Clutch Co.
* Hooven, Owens, Rentschler Co.
* Link-Belt Co.
* Lunkenheimer Co.
* McLain's Systems (Inc.)
* Vogt, Henry Machine Co.

Castings, Steel
Mackintosh, Hemphill & Co.

Castings, White Metal
* Alemite Die Casting & Mfg. Co.
* Barnhart Bros. & Spindler
* Doehler Die-Casting Co.
Stewart Mfg. Corp'n

Cement, Belt
Schieren, Chas. A. Co.

Cement, Refractory
* Johns-Manville, H. W. Co.
* Jointless Fire Brick Co.
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Cement Machinery
* Allis-Chalmers Mfg. Co.
* Caldwell, H. W. & Son Co.
* Fuller-Lehigh Co.
* Hill Clutch Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Centrifugal Blowers, Pumps
(See Blowers, Pumps, etc., Centrifugal)

Centrifugals, Chemical
Hepworth, S. S. Co

Centrifugals, Salt
Hepworth, S. S. Co

Centrifugals, Sugar
Hepworth, S. S. Co.
* Worthington Pump & Mchy. Corp'n

Chain Belts and Links
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Diamond Chain & Mfg. Co.
* Gifford-Wood Co.
* Jeffrey Mfg. Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Whitney Mfg. Co.

Chain Grate Stokers
(See Stokers, Chain Grate)

Chains, Power Transmission
* Baldwin Chain & Mfg. Co.
* Caldwell, H. W. & Son Co.
* Diamond Chain & Mfg. Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.
* Morse Chain Co.
* Whitney Mfg. Co.

Charging Machines, Furnace
* Alliance Machine Co.
* Morgan Engineering Co.

Chimneys, Brick
Brinckerhoff, H. Gordon Co.

Chimneys, Steel
(See Stacks, Steel)

Chucking Machines
* Jones & Lamson Machine Co.
Le Blond, R. K. Mch. Tool Co.
* Niles-Bement-Pond Co.
* Warner & Swasey Co.

Chucks, Drill
Eastern Tube & Tool Co. (Inc.)
* S K F Industries (Inc.)
* Whitney Mfg. Co.

Chucks, Magnetic
* Heald Machine Co.

Chucks, Tapping
* Whitney Mfg. Co.

Chutes
* Gifford-Wood Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.

Chutes, Gravity (Spiral)
Mathews Gravity Carrier Co.

Cinder Mills
(See Mills, Cinder)

Circuit Breakers
Condit Electrical Mfg. Co.
* General Electric Co.

Circulators, Feed Water
* Schutte & Koerting Co.

Circulators, Steam Heating
* Schutte & Koerting Co.

Clamps, Pipe
* Yarnall-Waring Co.

Clamps, Wire Rope
(See Wire Rope Fastenings)

Cloth, Blue Print
National Tracing Cloth Co.

Cloth, Tracing
National Tracing Cloth Co.
New York Blue Print Paper Co.

Clutches, Friction
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
Eastern Machinery Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
* Hill Clutch Co.
* Jeffrey Mfg. Co.
* Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
* Link-Belt Co.
* Medart Patent Pulley Co.
* Wood's, T. B. Sons Co.

Coal and Ash Handling Machinery
Beaumont, R. H. Co.
* Brown Hoisting Machinery Co.
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Gifford-Wood Co.
* Illinois Stoker Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.
Orton & Steinbrenner Co.
* Shepard Electric Crane & Hoist Co.

Coal Bins
* Brown Hoisting Machinery Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.

Coal Mine Equipment and Supplies
* General Electric Co.
* Jeffrey Mfg. Co.

Coal Mining Machinery
* General Electric Co.
* Ingersoll-Rand Co.
* Jeffrey Mfg. Co.

Coaling Stations, Locomotive
Beaumont, R. H. Co.
* Gifford-Wood Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.

Cocks, Air and Gage
* Ashton Valve Co.
* Crane Co
* Jenkins Bros.
* Lunkenheimer Co.
* Pratt & Cady Co. (Inc.)

Cocks, Blow-off
* Crane Co.
* Homestead Valve Mfg. Co. (Inc.)
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Pratt & Cady Co. (Inc.)

Cocks, Three-Way and Four-Way
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Homestead Valve Mfg. Co. (Inc.)
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Pratt & Cady Co. (Inc.)

Coils, Pipe
* Aluminum Co. of America
* Badger, E. B. & Sons Co.
* Dougherty, M. J. Co.
* Locomotive Superheater Co.
* National Pipe Bending Co.
* Vilter Mfg. Co.

Coke Oven Machinery
* Alliance Machine Co.

Cold Storage Plants
* De La Vergne Machine Co.

Collars, Shafting
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Hill Clutch Co.
* Link-Belt Co.
* Medart Patent Pulley Co.
* Royersford Fdry. & Mch. Co.
* Wood's, T B. Sons Co.

Coloring
* American Metal Treatment Co.

Combustion (CO_2) Recorders
* Foxboro Co. (Inc.)
* Precision Instrument Co.
* Sarco Co. (Inc.)

Combustion Control Systems
* Engineer Co.

Compounds, Boiler
Brinckerhoff, H. Gordon Co.

Compounds, Case-Hardening
Kasenit Co.

Compounds, Grinding
* Clover Mfg. Co.

Compounds, Lapping
* Clover Mfg. Co.

Compounds, Polishing
* Clover Mfg. Co.

Compounds, Valve Grinding
* Clover Mfg. Co.

Compressors, Air
* Chicago Pneumatic Tool Co.
Curtis Pneumatic Mchy. Co.
* General Electric Co.
* Goulds Mfg. Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Mackintosh, Hemphill & Co.
* Pangborn Corporation
* Worthington Pump & Machinery Corp'n

Compressors, Air Centrifugal
* De Laval Steam Turbine Co.
* General Electric Co.

Compressors, Air, Compound
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Compressors, Air, High Pressure
* Worthington Pump & Mchy. Corp'n

Compressors, Ammonia
* Vilter Mfg. Co.
* Worthington Pump & Machinery Corp'n

Compressors, Gas
* De Laval Steam Turbine Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Concrete Hardener
Sonneborn, L. Sons (Inc.)

Concrete Machinery
Chain Belt Co.

Condensation Return Systems
* Hobson, Russell B.

Condensers, Ammonia
* De La Vergne Machine Co.
* Vilter Mfg. Co.

Condensers, Barometric
* Ingersoll-Rand Co.
* United States Cast Iron Pipe & Fdry. Co.
* Wheeler Condenser & Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Jet
Elliott Co.
* Schutte & Koerting Co.
* Wheeler Condenser & Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Surface
* Braun, C. F. & Co.
Elliott Co.
* Westinghouse Elec. & Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Conduits
Eastern Tube & Tool Co. (Inc.)
* Johns-Manville, H. W. Co.

Connecting Rods
* Pollak Steel Co.

Controllers, Automatic for Temperature or for Pressure
(See Regulators)

Controllers, Electric
* General Electric Co.
* Morgan Engineering Co.
* Westinghouse Elec. & Mfg. Co.

Converters, Synchronous
* General Electric Co.
* Westinghouse Elec. & Mfg. Co.

Conveying Machinery
Beaumont, R. H. Co.
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Gifford-Wood Co
Heyl & Patterson (Inc.)
* Jeffrey Mfg. Co.
* Jones, W. A. Foundry & Mach. Co.
* Link-Belt Co.
Mathews Gravity Carrier Co.
* Robbins Engineering Co.
* Willcox Engineering Co.

Conveyor Systems, Pneumatic
* Allington & Curtis Mfg. Co.

Conveyors, Belt
* Caldwell, H. W. & Son Co.
* Gifford-Wood Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.

Conveyors, Bucket, Pan or Apron
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jeffrey Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
* Link-Belt Co.
* Robbins Engineering Co.

Conveyors, Gravity
Mathews Gravity Carrier Co.

Conveyors, Ice
* Gifford-Wood Co.
* Link-Belt Co.

Conveyors, Portable
* Robbins Engineering Co.

Conveyors, Screw
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.

Coolers, Oil
* Braun, C. F. & Co.

Cooling Ponds
* Badger, E. B. & Sons Co.

Cooling Ponds, Spray
* Badger, E. B. & Sons Co.
Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.
Star Brass Works
* Yarnall-Waring Co.

Cooling Towers
* Braun, C. F. & Co.
Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Copper Converting Machinery
* Alliance Machine Co.
* Worthington Pump & Machy. Corp'n

Copper, Drawn
* Roebling's, John A. Sons Co.

Copper, Wire and Cables
(See Wires and Cables, Electrical)

Copper Work
* Badger, E. B. & Sons Co.

Corliss Engines
(See Engines, Steam, Corliss)

Counters, Revolution
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Foxboro Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co.
Veeder Mfg. Co.

Countershafts
* Builders Iron Foundry
Diamond Machine Co.
* Hill Clutch Co.
* Wood's, T. B. & Sons Co.

Counting Machines, Automatic
* Veeder Mfg. Co.

Couplings, Flexible
Bartlett-Hayward Co.
Dexter, I. H. Co. (Inc.)
* Falls Clutch & Machinery Co.
* Fawcus Machine Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach Co.
Smith & Serrell
* Wood's, T. B. Sons Co.

Couplings, Pipe
Byers, A. M. Company
* Central Foundry Co.
* Crane Co.
* Lunkenheimer Co.

Couplings, Shaft
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
Chain Belt Co.
Cumberland Steel Co.
* Falls Clutch & Machinery Co.
* General Electric Co.
* Hill Clutch Co.
* Jeffrey Mfg. Co
* Jones, W. A. Fdry. & Mach. Co.
* Link-Belt Co
* Medart Patent Pulley Co.
* Royersford Fdry. & Mach. Co.
Smith & Serrell
* Wood's, T. B. Sons Co.

Couplings, Union
(See Unions)

Couplings, Universal Joint
* Wood's, T. B. Sons Co.

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1920 Volume*

CLASSIFIED LIST OF MECHANICAL EQUIPMENT (Continued)

FOR ALPHABETICAL INDEX, SEE PAGE 142

Coverings, Boiler Blow-Off
Woolson's, O. C. Sons

Coverings, Steam Pipe
* Johns-Manville, H. W. Co.
* Magnesia Assoc. of America

Cranes, Electric Traveling
* Alliance Machine Co.
* Morgan Engineering Co.
* Niles-Bement-Pond Co.
* Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
* Whiting Corp'n

Cranes, Floor (Portable)
* Lidgerwood Mfg. Co.

Cranes, Gantry
* Alliance Machine Co.
* Brown Hoisting Machinery Co.
* Link-Belt Co.
* Morgan Engineering Co.
* Niles-Bement-Pond Co.
* Northern Engineering Works
* Orton & Steinbrenner Co.
* Whiting Corp'n

Cranes, Hand Power
* Brown Hoisting Machinery Co.
Clyde Iron Works
Curtis Pneumatic Mchy. Co.
* Niles-Bement-Pond Co.
* Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
* Whiting Corp'n

Cranes, Hydraulic
* Alliance Machine Co.

Cranes, Jib
* Alliance Machine Co.
* Brown Hoisting Machinery Co.
Curtis Pneumatic Mchy. Co.
* Morgan Engineering Co
* Niles-Bement-Pond Co.
* Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
* Whiting Corp'n

Cranes, Locomotive
* Brown Hoisting Machinery Co.
* Link-Belt Co.
* Morgan Engineering Co.
* Orton & Steinbrenner Co.
* Whiting Corp'n

Cranes, Pillar
* Brown Hoisting Machinery Co.
* Northern Engineering Works
* Orton & Steinbrenner Co
* Whiting Corp'n

Cranes, Portable
* Brown Hoisting Machinery Co.
Clyde Iron Works
* Link-Belt Co.
* Pollak Steel Co.

Cranes, Pneumatic
Curtis Pneumatic Mchy. Co.

Crank Shafts
* Link-Belt Co.
* Pollak Steel Co.

Crushers, Coal
* Fuller-Lehigh Co.
Heyl & Patterson (Inc.)
* Jeffrey Mfg. Co.
* Link-Belt Co.
* Orton & Steinbrenner Co.
* Smidth, F. L. & Co
* Worthington Pump & Machinery Corp'n

Crushers, Jaw
* Worthington Pump & Machinery Corp'n

Crushers, Roll
Eastern Machinery Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.
* Orton & Steinbrenner Co.
Standard Equipment Co.
* Worthington Pump & Machinery Corp'n

Crushing and Grinding Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Jeffrey Mfg. Co.
* Smidth, F. L. & Co.
Standard Equipment Co.
* Worthington Pump & Machinery Corp'n

Crystallizers, Salt
* Willcox Engineering Co.

Cupolas
* Bigelow Co.
* Northern Engineering Works
* Whiting Corp'n

Cutters, Bolt
* Greenfield Tap & Die Corp'n
* Landis Machine Co. (Inc.)
* Niles-Bement-Pond Co.

Cutters, Milling
* Bilton Machine Tool Co.
Haynes Stellite Co.
* Whitney Mfg. Co.

Cutters, Pipe
* Niles-Bement-Pond Co.

Cutting-Off Machines, Metal
* Greenfield Tap & Die Corp'n
* Niles-Bement-Pond Co.

Damper Regulators
(See Regulators, Damper)

Dehumidifying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n

Derricks and Derrick Fittings
Clyde Iron Works
* Lidgerwood Mfg. Co.

Die Castings
(See Castings, Die, Moulded)

Dies, Blanking
* Bliss, E. W. Co.

Dies, Punching
* Bliss, E. W. Co.

Dies, Sheet Metal Working
* Bliss, E. W. Co.

Dies, Thread Cutting
* Greenfield Tap & Die Corp'n
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)
* Pratt & Whitney Co.

Dies, Thread Cutting (Self-opening)
* Greenfield Tap & Die Corp'n
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Diesel Engines
(See Engines, Oil, Diesel)

Digesters
* Bigelow Co.

Digesters, Pulp
* Hooven, Owens, Rentschler Co.

Distilling Apparatus
* Braun, C. F. & Co.

Doors, Boiler Access
Woolson's, O. C. Sons

Draft Control Systems
* Engineer Co.

Drawing Materials
New York Blue Print Paper Co.

Dredges, Hydraulic
* Morris Machine Works

Drilling Machines
* Niles-Bement-Pond Co.

Drilling Machines, Electric Portable

Drilling Machines, Sensitive
* Bilton Machine Tool Co.
* Pratt & Whitney Co.
* Royersford Fdry. & Mach. Co.

Drilling Machines, Vertical
* Bilton Machine Tool Co.
* Niles-Bement-Pond Co.
* Royersford Fdry. & Mch. Co.

Drills, Coal and Slate
* General Electric Co.
* Jeffrey Mfg. Co.

Drills, Rock
* Chicago Pneumatic Tool Co.
* General Electric Co.
* Ingersoll-Rand Co.

Drinking-Fountains, Sanitary
* Johns-Manville, H. W. Co.
* Manufacturing Equipment & Engrg. Co.

Drop Forgings, Hammers, etc.
(See Forgings, Hammers, etc., Drop)

Drums, Brake
* Worcester Pressed Steel Co.

Dryers, Coal (Centrifugal)
* Link-Belt Co.

Dryers, Rotary
* Bigelow Co.
* Fuller-Lehigh Co.
* Link-Belt Co

Dryers, Sand
* Pangborn Corporation

Drying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
* Philadelphia Drying Machinery Co.
* Proctor & Schwartz (Inc.)

Dumb Waiters
* Sedgwick Machine Works

Dust Arresting Systems
* Pangborn Corporation

Dust Collecting Systems
* Allington & Curtis Mfg. Co.

Dust Collectors
* Allington & Curtis Mfg. Co.
* Pangborn Corporation

Dustproofing Materials
Sonneborn, L. Sons (Inc.)

Dyeing Machinery
* Philadelphia Drving Machinery Co.

Dynamic Balancing Machines
(See Balancing Machines, Dynamic)

Dynamometers
* General Electric Co.
* Schaeffer & Budenberg Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Economizers, Fuel
* Green Fuel Economizer Co.

Ejectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Ejectors, Ash
Green Engineering Co.

Electric Generators, Hoists, Trucks, Welding, etc.
(See Generators, Hoists, Trucks, Welding, etc., Electric)

Electrical Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Elec. & Mfg. Co.

Electrical Measuring Instruments
(See Instruments, Electrical Measuring)

Electrical Protective Equipment
Condit Electrical Mfg. Co.

Electrical Supplies
* General Electric Co.
* Johns-Manville, H. W. Co

Elevating and Conveying Machinery
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hill Clutch Co.
* Jeffrey Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
* Link-Belt Co.
* Robbins Engineering Co.

Elevators, Electric
Albro-Clem Elevator Co.
Eastern Machinery Co.
* Northern Engineering Works

Elevators, Hand Power
* Sedgwick Machine Works

Elevators, Passenger and Freight
* Albro-Clem Elevator Co.
Eastern Machinery Co.
* Northern Engineering Works

Emery Wheel Dressers
* Builders Iron Foundry

Engine Stops
* Schutte & Koerting Co.

Engineers, Consulting
(See Professional and Educational Directory)

Engines, Blowing
* Hooven, Owens, Rentschler Co.
Mackintosh, Hemphill & Co.
* Worthington Pump & Machinery Corp'n

Engines, Corliss
* Hooven, Owens, Rentschler Co.
Sun Shipbuilding Co.

Engines, Gas
* Allis-Chalmers Mfg. Co.
Bartlett-Hayward Co.
* Chicago Pneumatic Tool Co.
* De La Vergne Machine Co.
* Hooven, Owens, Rentschler Co.
* National Meter Co.
* Westinghouse Elec. & Mfg. Co.

Engines, Gasoline
Bartlett-Hayward Co.
* National Meter Co.
* Worthington Pump & Machinery Corp'n

Engines, Hoisting
Clyde Iron Works
* Lidgerwood Mfg. Co.
* Morris Machine Works
* Orton & Steinbrenner Co.

Engines, Kerosene
* Worthington Pump & Machinery Corp'n

Engines, Marine
* Hooven, Owens, Rentschler Co.
* Johnson, Carlyle Machine Co.
* Ward, Chas. Engineering Co.
* Worthington Pump & Machinery Corp'n

Engines, Naptha
* Allis-Chalmers Mfg. Co.

Engines, Oil
* Chicago Pneumatic Tool Co.
* De La Vergne Machine Co.
* Midwest Engine Co.
* Worthington Pump & Machinery Corp'n

Engines, Oil, Diesel
* Midwest Engine Co.
* Worthington Pump & Machinery Corp'n

Engines, Pumping
* Hooven, Owens, Rentschler Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Engines, Steam
* Ball Engine Co.
* Chicago Pneumatic Tool Co.
Clyde Iron Works
* Cole, R. D. Mfg. Co.
* Erie City Iron Works
* Hooven, Owens, Rentschler Co.
* Leffel, James & Co.
* Lidgerwood Mfg. Co.
* Mackintosh, Hemphill & Co.
* Morris Machine Works
* Troy Engine & Machine Works
* Vilter Mfg. Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Engines, Steam, Automatic
* American Blower Co.
* Ball Engine Co.
* Erie City Iron Works
* Leffel, James & Co.
Schofield's, J. S. Sons Co.
* Troy Engine & Machine Works
* Westinghouse Electric & Mfg. Co.

Engines, Steam, Corliss
* Allis-Chalmers Mfg. Co.
* Ball Engine Co.
* Hooven, Owens, Rentschler Co.
Mackintosh, Hemphill & Co.
* Vilter Mfg. Co.

Engines, Steam, High Speed
* American Blower Co.
* Ball Engine Co.
* Erie City Iron Works

Engines, Steam, Poppet Valve
* Erie City Iron Works
* Vilter Mfg. Co

Engines, Steering
* Lidgerwood Mfg. Co.

Engines, Traction
* Allis-Chalmers Mfg. Co

Evaporators
* Braun, C. F. & Co.

Evaporators, Salt
* Willcox Engineering Co.

Excavating Machinery
Clyde Iron Works
* Lidgerwood Mfg. Co.
* Link-Belt Co.
Orton & Steinbrenner Co.

Exhaust Systems
* Allington & Curtis Mfg. Co.
* American Blower Co.
* Pangborn Corporation

Exhausters, Gas
* General Electric Co.
* Green Fuel Economizer Co.
* Schutte & Koerting Co.

Expansion Joints
(See Joints, Expansion)

Extractors, Oil and Grease
* Braun, C. F. & Co.

Factory Equipment, Metal
* Manufacturing Equipment & Engrg. Co.

Fans, Exhaust
* American Blower Co.
* General Electric Co.
* Green Fuel Economizer Co.
* Jeffrey Mfg. Co.
* Pangborn Corporation
* Philadelphia Drying Machinery Co.

Feed Water Circulators, Heaters, Heaters and Purifiers, etc.
(See Circulators Heaters, Heaters and Purifiers, etc., Feed Water)

Feeders, Pulverized Fuel
Combustion Engineering Corp'n
* Fuller-Lehigh Co.
Heyl & Patterson
* Smidth, F. L. & Co.

Ferro Molybdenum
Climax Molybdenum Co.

Fibre, Vulcanized
* Continental Fibre Co.

Filters, Oil
Elliott Co.
* General Electric Co.
* Richardson-Phenix Co.

Filters, Water
* Braun, C. F. & Co.
Elliott Co.
Graver Corp'n
* H. S. B. W.-Cochrane Corp'n
* Scaife, Wm. B. & Sons Co.

Filtration Plants
* H. S. B. W.-Cochrane Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Fire Brick, Fire Hydrants, etc.
(See Brick, Hydrants, Fire, etc.)

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1920 Volume*

 FOR ALPHABETICAL INDEX, SEE PAGE 142

Fire Tube Boilers
(See Boilers, Return and Vertical Tubular)

Fittings, Aluminum
* Aluminum Co. of America

Fittings, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Fittings, Compression
* Richardson-Phenix Co.

Fittings, Flanged
* Builders Iron Foundry
* Central Foundry Co.
* Crane Co.
* Dougherty, M. J. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Valve & Fittings Co.
* United States Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.

Fittings, Hydraulic
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Fittings, Pipe
* Barco Mfg. Co.
* Central Foundry Co.
* Crane Co.
* Dougherty, M. J. Co.
* Lunkenheimer Co.
* National Supply Cos.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Valve & Fittings Co.
* Vogt, Henry Machine Co.

Fittings, Steel
* Crane Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Valve & Fittings Co.
* Vogt, Henry Machine Co.

Flanges
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Valve & Fittings Co.
* Vogt, Henry Machine Co.

Flanges, Hub
* Worcester Pressed Steel Co.

Flanging Machines
* Morgan Engineering Co.

Flexible Metallic Packing
(See Packing Metallic)

Floor Stands
* Crane Co.
* Hunt, Rodney Machine Co.
* Jones, W. A. Fdry. & Mach. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Pratt & Cady Co. (Inc.)
* Schutte & Koerting Co.
* Wood's, T. B. Sons Co.

Flour Milling Machinery
* Allis-Chalmers Mfg. Co.

Fly Wheels
* Medart Patent Pulley Co.
* Wood's, T. B. Sons Co.

Forges
* Best, W. N. (Inc.)
* Bradley, C. C. & Son (Inc.)
* Chicago Flexible Shaft Co.

Forges, Oil
* Chicago Flexible Shaft Co.
* Rockwell, W. S. Co.

Forges, Rivet
* Chicago Flexible Shaft Co.
* Rockwell, W. S. Co.

Forgings, Alloy Steel
* American Forge & Machine Co.

Forgings, Drop
* American Forge & Machine Co.
* Bradley, C. C. & Son (Inc.)
Hay-Budden Mfg. Co.
* Pollak Steel Co.
* Vogt, Henry Machine Co.

Forgings, Hammered
* Bradley, C. C. & Son (Inc.)

Forgings, Heavy
* American Forge & Machine Co.
* Pollak Steel Co.

Forgings, Iron
* American Forge & Machine Co.
* Bradley, C. C. & Son (Inc.)
* Pollak Steel Co.

Forgings, Steel
* American Forge & Machine Co.
* Bradley, C. C. & Son (Inc.)
Electric Steel & Forge Co.
Hay-Budden Mfg. Co.
* Pollak Steel Co.
* Worcester Pressed Steel Co.

Foundations, Machinery
General Machinery Foundations Co.

Foundry Equipment
* Northern Engineering Works
Osborn Mfg. Co.
Standard Equipment Co.
* Whiting Corp'n

Friction Clutches, Hoists, etc.
(See Clutches, Hoists, etc., Friction)

Friction Drives
Rockwood Mfg. Co.

Frictions, Paper and Iron
* Caldwell, H. W. & Son Co.
* Link-Belt Co.
* Rockwood Mfg. Co.

Fuel Economizers
(See Economizers, Fuel)

Furnace Linings
(See Linings, Furnace)

Furnaces, Annealing and Tempering
* Best, W. N. (Inc.)
* Chicago Flexible Shaft Co.
* General Electric Co.
* Rockwell, W. S. Co.

Furnaces, Boiler
* American Engineering Co.
* Babcock & Wilcox Co.
* Best, W. N. (Inc.)
Combustion Engineering Corp'n
* Murphy Iron Works
* Riley, Sanford Stoker Co. (Ltd.)
* Underfeed Stoker Co. of America

Furnaces, Gas
* Chicago Flexible Shaft Co.
* Rockwell, W. S. Co.

Furnaces, Heat Treating
* Best, W. N. (Inc.)
* Chicago Flexible Shaft Co.
* General Electric Co.
* Rockwell, W. S. Co.

Furnaces, Melting
* Best, W. N. (Inc.)
* Chicago Flexible Shaft Co.
* General Electric Co.
* Rockwell, W. S. Co.
* Whiting Corp'n

Furnaces, Oil
* Best, W. N. (Inc.)
* Chicago Flexible Shaft Co.
Hammel Oil Burning Equipment Co.
* Rockwell, W. S. Co.

Furnaces, Smokeless
* American Engineering Co.
* Babcock & Wilcox Co.
Combustion Engineering Corp'n
Herbert Boiler Co.
* Illinois Stoker Co.
* Murphy Iron Works
* Riley, Sanford Stoker Co. (Ltd.)
* Underfeed Stoker Co. of America

Fuses
Conduit Electrical Mfg. Co.
* General Electric Co.
* Johns-Manville, H. W. Co.

Gage Boards
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Foxboro Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co.

Gage Testers
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co.

Gages, Altitude
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.

Gages, Ammonia
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Foxboro Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co.

Gages, Ball
* S. K. F. Industries (Inc.)

Gages, Differential Pressure
* Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Foxboro Co. (Inc.)
* Precision Instument Co.

Gages, Draft
* Ashton Valve Co.
* Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Foxboro Co. (Inc.)
* Precision Instrument Co.
* Schaeffer & Budenberg Mfg. Co.
* Taylor Instrument Cos.

Gages, Hydraulic
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Foxboro Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co.

Gages, Measuring (Surface, Depth, Dial, etc.)
Johansson, C. E. (Inc.)
* Norma Co. of America
* Pratt & Whitney Co.
* S K F Industries (Inc.)
* Starrett, L. S. Co.

Gages, Pressure
* Ashton Valve Co.
* Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Crosby Steam Gage & Valve Co.
* Foxboro Co. (Inc.)
* Precision Instrument Co.
* Schaeffer & Budenberg Mfg. Co.

Gages, Thread
* Greenfield Tap & Die Corp'n

Gages, Vacuum
* Ashton Valve Co.
* Bacharach Industrial Instrument Co.
* Crosby Steam Gage & Valve Co.
* Foxboro Co. (Inc.)
* Precision Instrument Co.
* Schaeffer & Budenberg Mfg. Co.
* Taylor Instrument Cos.

Gages, Water
* Ashton Valve Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Pratt & Cady Co. (Inc.)

Gages, Water Level
* Foxboro Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co.

Gas Analysis Apparatus
* Foxboro Co. (Inc.)
* Precision Instrument Co.

Gas Burners, Compressors, Engines, Exhausters, Producers, etc.
(See Burners, Compressors, Engines, Exhausters, Producers, etc., Gas)

Gas Burning Equipment
* Chicago Flexible Shaft Co.
* Rockwell, W. S. Co.

Gas Collectors
* Precision Instrument Co.

Gas Plant Machinery
Bartlett-Hayward Co
* Cole, R. D. Mfg. Co.
Cooper, C. & G. Co.
* Rockwell, W. S. Co.

Gas Well Supplies
* National Supply Cos.

Gaskets
* Goetze Gasket & Packing Co.
* Jenkins Bros.
* Johns-Manville, H. W. Co.
* Sarco Co. (Inc.)

Gasoline
* Texas Co.

Gates, Blast
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.
* Rockwell, W. S. Co.

Gates, Cut-Off
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.

Gates, Sluice
* Hunt, Rodney Machine Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Gear Cutting Machines
* Bilton Machine Tool Co.
* Jones, W. A. Fdry. & Mch. Co.

Gear Generators
* Niles-Bement-Pond Co.

Gear Hobbing Machines
* Bilton Machine Tool Co.
* Jones, W. A. Fdry. & Mch. Co.

Gear Shapers
* Fellows Gear Shaper Co.

Gears, Cut
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
Grant-Lees Gear Co.
* Hill Clutch Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jeffrey Mfg. Co.
* Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
* Link-Belt Co.
Mackintosh, Hemphill & Co.
* Medart Patent Pulley Co.
* New Process Gear Corp'n
* Northern Engineering Works

Gears, Fibre
* Continental Fibre Co.
General Electric Co.
* James, D. O. Mfg. Co.

Gears, Machine Molded
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
* Hill Clutch Co.
* Jones, W. A. Fdry. & Mch. Co.

Gears, Rawhide
* James, D. O. Mfg. Co.

Gears, Speed Reduction
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
* Kerr Turbine Co.
* Moore Steam Turbine Corp'n
* Westinghouse Electric & Mfg. Co.

Gears, Worm
Albro-Clem Elevator Co.
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Cleveland Worm Gear Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* Gifford-Wood Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jeffrey Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
* Link-Belt Co.

Generating Sets
* American Blower Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Westinghouse Elec. & Mfg. Co.

Generators, Electric
* De Laval Steam Turbine Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Generators, Oxy-Hydrogen
* International Oxygen Co.

Glass Machinery, Plate
* Hooven, Owens, Rentschler Co.

Governors, Pump
Hammel Oil Burning Equipment Co.
* Illinois Engineering Co.
* Richardson-Phenix Co.

Governors, Water Wheel
* Hunt, Rodney Machine Co.
* Worthington Pump & Machinery Corp'n

Granulators
* Smidth, F. L. & Co.

Grate Bars
* Casey-Hedges Co.
Combustion Engineering Corp'n
* Erie City Iron Works
* Vogt, Henry Machine Co.

Grates, Dumping
* Budd Grate Co.
Combustion Engineering Corp'n
* Vogt, Henry Machine Co.

Grates, Shaking
* Budd Grate Co.
* Casey-Hedges Co.
Combustion Engineering Corp'n
* Erie City Iron Works
* Springfield Boiler Co.
* Vogt, Henry Machine Co.

Grates, Stationary
* Budd Grate Co.

Grease Cups
(See Oil and Grease Cups)

Grease Extractors
(See Separators, Oil)

Greases
* Royersford Foundry & Machine Co.
* Texas Co.

Grinding Machinery
* Brown, A. & F. Co.
* Jeffrey Mfg. Co.
* Niles-Bement-Pond Co.
* Smidth, F. L. & Co.

Grinding Machines, Chaser
* Landis Machine Co. (Inc.)
* Niles-Bement-Pond Co.

Grinding Machines, Cutter
Diamond Machine Co.
Le Blond, R. K. Mch. Tool Co.

Grinding Machines, Disc
Diamond Machine Co.
* Niles-Bement-Pond Co.

Grinding Machines, Floor
* Builders Iron Foundry
Diamond Machine Co.
* Royersford Foundry & Machine Co.

Grinding Machines, Internal
Diamond Machine Co.
* Heald Machine Co.

Grinding Machines, Surface
Diamond Machine Co.
* Heald Machine Co.
* Pratt & Whitney Co.

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1920 Volume*

Goulds Pumps for Real Service

PUMPING STATION OF THE WATER WORKS DEPARTMENT, SCHLEISINGERVILLE, WIS.

Nothing better illustrates the real service Goulds Pumps give than the voluntary reports of users. O. C. Bartlett, superintendent of Water Works Department, Schleisingerville, Wisconsin, wrote us recently: "Your Fig. 1009 Triplex Pump has been in use every day in the year since 1911 without fail or any repairs. It has proved very satisfactory, and if we install another pump it will be a Goulds. This pump serves a three mile main and operates under a 130 foot head. The maintenance cost for eight years has been $4.75."

What better service could anyone desire? The sturdy construction of Goulds Pumps enables them to give long years of satisfactory service. Every Goulds Pump is guaranteed to perform satisfactorily the specific work for which it is sold—*and does it.*

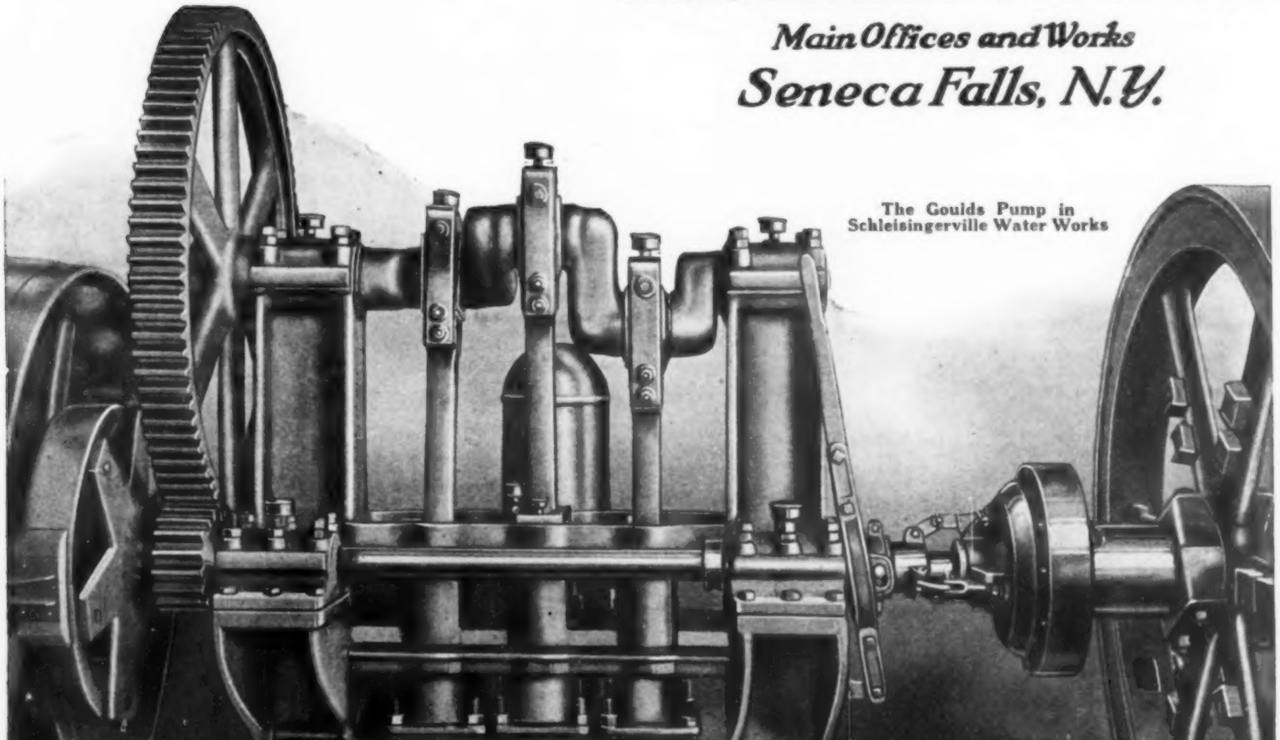
Our engineers will be pleased to co-operate with you on the solution of any pumping problem. In the manufacture of pumps for every kind of industrial and engineering purpose we have gained a vast fund of information and data that is at your disposal.

GOULDS PUMPS FOR EVERY SERVICE

The GOULDS MFG. CO.

Main Offices and Works

Seneca Falls, N.Y.



The Goulds Pump in Schleisingerville Water Works

Grinding Machines, Tool
Diamond Machine Co.
Le Blond, R. K. Mch. Tool Co.
* Niles-Bement-Pond Co.

Gun Metal Finish
* American Metal Treatment Co.

Hammers, Drop
* Alliance Machine Co.
* Bliss, E. W. Co.
* Niles-Bement-Pond Co.

Hammers, Pneumatic
* Ingersoll-Rand Co.

Hammers, Power
Beaudry & Co. (Inc.)
* Bradley, C. C. & Son (Inc.)
* Niles-Bement-Pond Co.

Hammers, Shell Nosing
Beaudry & Co. (Inc.)

Hammers, Steam
* Alliance Machine Co.
Beaudry & Co. (Inc.)
* Morgan Engineering Co.
* Niles-Bement-Pond Co.

Hangers, Shaft
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Falls Clutch & Machinery Co.
* Hill Clutch Co.
* Jeffrey Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
* Link-Belt Co.
* Medart Patent Pulley Co.
* Royersford Foundry & Machine Co.
* Wood's, T. B. Sons Co.

Hangers, Shaft (Ball and Roller Bearing)
* Hunt, Rodney Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
* S K F Industries (Inc.)

Hardening
* American Metal Treatment Co.
* Chicago Flexible Shaft Co.
* Rockwell, W. S. Co.

Headers, Welded
* Dougherty, M. J. Co.

Heat Treating
* American Metal Treatment Co.
* Chicago Flexible Shaft Co.
* Pollak Steel Co.
* Rockwell, W. S. Co.

Heaters, Feed Water (Closed)
* Braun, C. F. & Co.
* Erie City Iron Works
* National Pipe Bending Co.
* Schutte & Koerting Co.
* Wheeler Condenser & Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Heaters, Feed Water, Locomotive (Open)
* Worthington Pump & Machinery Corp'n

Heaters, Oil
* Braun, C. F. & Co.
Hammel Oil Burning Equipment Co.
* Lockett, A. M. & Co. (Ltd.)

Heaters and Mixers, Water, Instantaneous
* Manufacturing Equipment & Engrg. Co.

Heaters and Purifiers, Feed Water (Open)
Elliott Co.
* Erie City Iron Works
* H. S. B. W. Cochrane Corp'n
* National Pipe Bending Co.
* Springfield Boiler Co.
* Wickes Boiler Co.
* Worthington Pump & Machinery Corp'n

Heaters and Purifiers, Feed Water, Metering
* H. S. B. W.-Cochrane Corp'n

Heat Exchangers
* Braun, C. F. & Co.

Heating and Ventilating Apparatus
* American Blower Co.

Heating Systems, Vacuum
* Illinois Engineering Co.

Hoisting and Conveying Machinery
* Brown Hoisting Machinery Co.
Clyde Iron Works
* Gifford-Wood Co.
* Jeffrey Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
* Lidgerwood Mfg. Co.
* Link-Belt Co.
* Northern Engineering Works
Orton & Steinbrenner Co.
* Shepard Electric Crane & Hoist Co.

Hoists, Air
Curtis Pneumatic Mchy. Co.
* Ingersoll-Rand Co.
* Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
* Whiting Corp'n

Hoists, Belt
Clyde Iron Works
* Lidgerwood Mfg. Co.

Hoists, Chain
* Ford Chain Block Co.
* Northern Engineering Works
Yale & Towne Mfg. Co.

Hoists, Electric
Albro-Clem Elevator Co.
* Alliance Machine Co.
* Brown Hoisting Machinery Co.
Clyde Iron Works
* General Electric Co.
* Lidgerwood Mfg. Co.
* Link-Belt Co.
* Niles-Bement Pond-Co.
* Northern Engineering Works
Orton & Steinbrenner Co.
* Shepard Electric Crane & Hoist Co.

Hoists, Friction
Eastern Machinery Co.

Hoists, Gas and Gasoline
* Lidgerwood Mfg. Co.

Hoists, Head Gate
* Hunt, Rodney Machine Co.
Smith, S. Morgan Co.

Hoists, Mine
* Lidgerwood Mfg. Co.

Hoists, Skip
Beaumont, R. H. Co.
* Brown Hoisting Machinery Co.
* Jeffrey Mfg. Co.
* Lidgerwood Mfg. Co.
* Link-Belt Co.

Hoists, Steam
(See Engines, Hoisting)

Holly Gravity Return Systems
(See Condensation Return systems)

Hose, Metallic
* Johns-Manville, H. W. Co.

Humidifiers
* American Blower Co.
* Carrier Engineering Corp'n

Humidity Control
* American Blower Co.
* Carrier Engineering Corp'n

Hydrants, Fire
* Pratt & Cady Co. (Inc.)
* Worthington Pump & Machinery Corp'n

Hydraulic Machinery
* Alliance Machine Co.
Mackintosh, Hemphill & Co.
* Morgan Engineering Co.
* Niles-Bement-Pond Co.
* Worthington Pump & Machinery Corp'n

Hydraulic Rams, Presses, Turbines, etc.
(See Rams, Presses, Turbines, etc., Hydraulic)

Hydrogen Gas
* International Oxygen Co.

Hydrokineters
* Schutte & Koerting Co.

Hydrometers
* Taylor Instrument Cos.

Hygrometers
* Foxboro Co. (Inc.)
* Taylor Instrument Cos.

Ice Making Machinery
* De La Vergne Machine Co.
* Johns-Manville, H. W. Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Ice Tools
* Caldwell, H. W. & Son Co.
* Gifford-Wood Co.

Idlers (Lenix)
* Smidth, F. L. & Co.

Indicator Posts
* Crane Co.
* Pratt & Cady Co. (Inc.)

Indicators, CO_2
* Bacharach Industrial Instrument Co.
* Foxboro Co. (Inc.)
* Precision Instrument Co.

Indicators, Engine
* Bacharach Industrial Instrument Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co.

Indicators, Sight Flow
* Richardson-Phenix Co.

Indicators, Speed
* Foxboro Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co.
Veeder Mfg. Co.
* Weston Electrical Instrument Co.

Industrial Railways
(See Railways, Industrial)

Ingot Strippers
* Alliance Machine Co.
* Morgan Engineering Co.

Injectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Instruments, Electrical Measuring
* General Electric Co.
* Taylor Instrument Cos.
* Westinghouse Elec. & Mfg. Co.
* Weston Electrical Instrument Co.

Instruments, Recording
* Ashton Valve Co.
* Bacharach Industrial Instrument Co.
* Bailey Meter Co.
Brinckerhoff, H. Gordon Co.
* Builders Iron Foundry
* Crosby Steam Gage & Valve Co.
* Foxboro Co. (Inc.)
* General Electric Co.
* Precision Instrument Co.
* Schaeffer & Budenberg Mfg. Co.
* Taylor Instrument Cos.
* Westinghouse Electric & Mfg. Co.
* Yarnall-Waring Co.

Instruments, Scientific
* Taylor Instrument Cos.

Instruments, Surveying
* New York Blue Print Paper Co.

Insulating Materials (Elec.)
* Continental Fibre Co.
* General Electric Co.
* Johns-Manville, H. W. Co.

Insulating Materials (Heat and Cold)
* Johns-Manville, H. W. Co.
* Magnesia Assoc. of America.

Irrigation Systems
* Spray Engineering Co.

Joints, Expansion
* Badger, E. B. & Sons Co.
* Braun, C. F. & Co.
* Crane Co.
* Illinois Engineering Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Wheeler, C. H. Mfg. Co.

Joints, Flanged Pipe
* Crane Co.
* Dougherty, M. J. Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Joints, Flexible
* Barco Mfg. Co.

Joints, Swing and Swivel
* Barco Mfg. Co.

Joints, Universal
Spicer Mfg. Corp'n
Dexter, I. H. Co. (Inc.)

Kettles, Soda
* Manufacturing Equipment & Engrg. Co.

Kettles, Steam Jacketed
* Aluminum Co. of America
* Cole, R. D. Mfg. Co.

Keys, Machine
* Whitney Mfg. Co.

Keyseating Machines
* Whitney Mfg. Co.

Kilns, Dry (Brick, Lumber, Stone, etc.)
* American Blower Co.

Knives, Machine
* Simonds Mfg. Co.

Ladder Steps, Non-Slipping
(See Steps, Ladder and Stair (Non-Slipping)

Ladles
* Northern Engineering Works
* Whiting Corp'n

Lamps, Incandescent
* General Electric Co.
* Johns-Manville, H. W. Co.
* Westinghouse Electric & Mfg. Co.

Land-Clearing Machinery
Clyde Iron Works

Lathe Attachments
Diamond Machine Co.
LeBlond, R. K. Mch. Tool Co.

Lathes, Automatic
* Jones & Lamson Machine Co.

Lathes, Brass
* Warner & Swasey Co.

Lathes, Chucking
* Jones & Lamson Machine Co.
* Niles-Bement-Pond Co.

Lathes, Engine
* Builders Iron Foundry
LeBlond, R. K. Mch. Tool Co.
* Niles-Bement-Pond Co.
* Pratt & Whitney Co.

Lathes, Speed
Diamond Machine Co.
LeBlond, R. K. Mch. Tool Co.
* Niles-Bement-Pond Co.

Lathes, Turret
* Jones & Lamson Machine Co.
* Niles-Bement-Pond Co.
* Pratt & Whitney Co.
* Warner & Swasey Co.

Leather, Friction
Schieren, Chas. A. Co.

Leathers, Pump
Schieren, Chas. A. Co.

Leather Belting, Packing, etc.
(See Belting, Packing, etc., Leather)

Levers, Flexible (Wire)
* Gwilliam Co.

Lightning Arresters
* General Electric Co.

Lining, Brake
* Johns-Manville, H. W. Co.

Lining, Furnace
* Best, W. N. (Inc.)
Brinckerhoff, H. Gordon Co.
* Chicago Flexible Shaft Co.
* Crescent Refractories Co.
* Johns-Manville, H. W. Co.
* Jointless Fire Brick Co.

Lining, Stack
* Johns-Manville, H. W. Co.

Liquid Fuel Equipment
* Best, W. N. (Inc.)

Loaders, Portable
* Robbins Engineering Co.

Loaders, Wagon
Chain Belt Co.
* Gifford-Wood Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.
* Robbins Engineering Co.

Lockers, Metal
* Manufacturing Equipment & Engrg. Co.

Locomotives, Electric
* General Electric Co.
* Jeffrey Mfg. Co.
* Westinghouse Elec. & Mfg. Co.

Locomotives, Storage Battery
* General Electric Co.
* Jeffrey Mfg. Co.
* Westinghouse Electric & Mfg. Co.

Logging Machinery
Clyde Iron Works
* Lidgerwood Mfg. Co.

Lubricants
* Royersford Fdry. & Mach. Co.
* Texas Co.

Lubricating Systems
* Alemite Die-Casting & Mfg. Co.
* Greene, Tweed & Co.
* Richardson-Phenix Co.

Lubricators, Cylinder
* Greene, Tweed & Co.
* Lunkenheimer Co.
* Richardson-Phenix Co.

Lubricators, Force-Feed
* Greene, Tweed & Co.
* Lunkenheimer Co.
* Richardson-Phenix Co.

Lubricators, Hydrostatic
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Lubricators (Sight Feed)
* Crosby Steam Gage & Valve Co.

Machine Work
* Brown, A. & F. Co.
* Budd grate Co.
* Builders Iron Foundry
* Caldwell, H. W. & Son Co.
* Hill Clutch Co.
* Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
* Lammert & Mann Co.
* Link-Belt Co.
Sun Shipbuilding Co.

Machinery
(Is classified under the headings descriptive of character thereof)

Machinery Foundations
(See Foundations, Machinery)

Magnesia Products
* Magnesia Assoc. of America

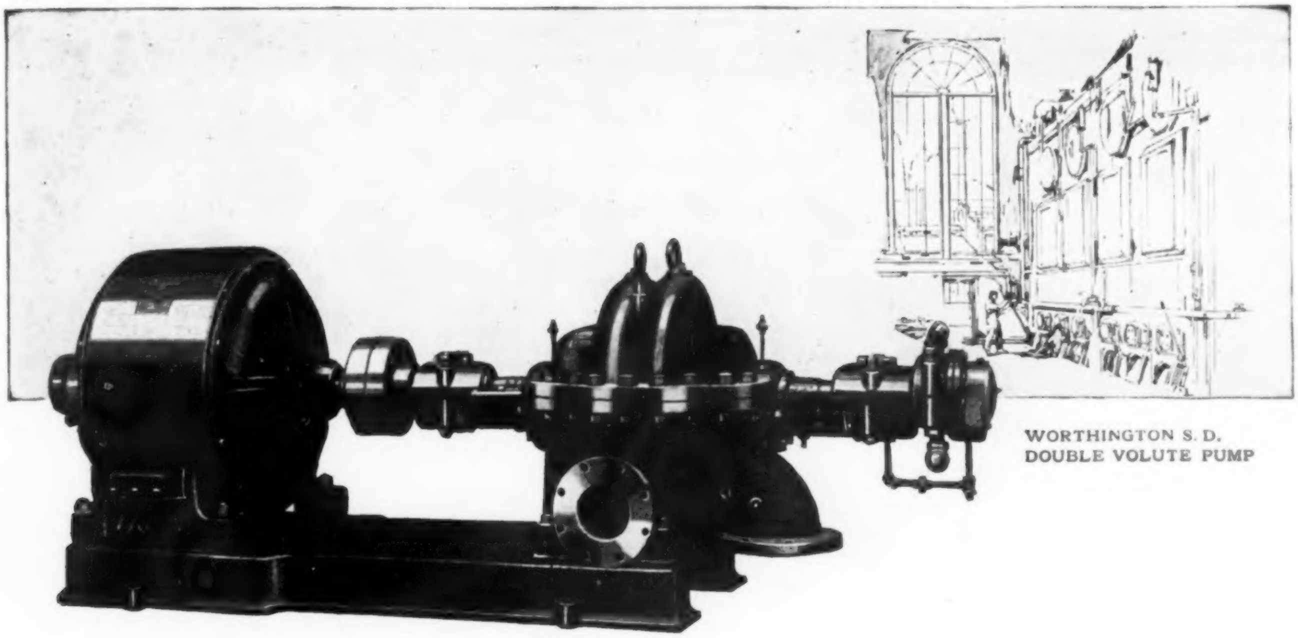
Manifolds, Aluminum
* Aluminum Co. of America

Mechanical Draft Apparatus
* American Blower Co.
* Green Fuel Economizer Co

Mechanical Stokers
(See Stokers)

Metal Cutting Machines
(See Cutting-off Machines, Metal)

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1920 Volume*



WORTHINGTON S. D.
DOUBLE VOLUTE PUMP

Centrifugal pump development owes much to Worthington

CENTRIFUGAL pump building as practised by Worthington is a fine art. Because, for each particular pumping service the Worthington engineering corps has developed a particular centrifugal type which delivers with maximum efficiency and economy.

For fire protection, for heads above single impeller limits, for unwatering — for general pumping duty, Worthington S. D. Double Volute Pump can be standardized on. Parts are interchangeable, and simplicity of design is attained by using the double volute feature which eliminates diffusion rings. Because impellers are "back to back," there is no end thrust, and there is a minimum of slippage points.

Worthington S. D. Double Volute Pump rounds out a full centrifugal pump service and typifies the wonderful 80 years old organization which sponsors it.

Other Worthington Products:

Steam, Power, Centrifugal and Water Works Pumps, Meters, Oil Engines, Condensing Machinery, Air Compressors, Vacuum Pumps and Water Wheels.

To further enlarge their service, Worthington have acquired the good-will and mechanical equipment of the Platt Iron Works, Dayton, Ohio, for manufacturing Oil Mill Machinery, Hydraulic Turbines, Feed Water Heaters and High Pressure Air Compressors.

WORTHINGTON PUMP AND MACHINERY CORPORATION
Executive Offices: **115 Broadway, New York City**
Branch Offices in 24 Large Cities

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PUMPS—COMPRESSORS—CONDENSERS—OIL & GAS ENGINES—METERS—MINING—ROCK CRUSHING & CEMENT MACHINERY

WORTHINGTON

Deane Works, *Holyoke, Mass.*
Blake & Knowles Works *East Cambridge, Mass.*
Worthington Works *Harrison, N. J.*
Laidlaw Works, *Cincinnati, Ohio.*

Hazleton Works, *Hazleton, Pa.*

Gas Engine Works, *Cudahy, Wis.*
Power & Mining Works *Cudahy, Wis.*
Snow-Holly Works *Buffalo, N. Y.*
Epping-Carpenter, *Pittsburgh, Pa.*

Metal Equipment
* Manufacturing Equipment & Engrg. Co.

Metal Reclaiming Mills
(See Mills, Metal Reclaiming)

Metal Treating
* American Metal Treatment Co.
* Rockwell, W. S. Co.

Metals, Anti-Friction
American Bronze Corp'n

Metals, Bearing
American Bronze Corp'n
* General Electric Co.

Metals, Perforated
* Hendrick Mfg. Co.

Meters, Air and Gas
* Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* Foxboro Co. (Inc.)
* General Electric Co.

Meters, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
* Weston Electrical Instrument Co.

Meters, Feed Water
Bailey Meter Co.
* Builders Iron Foundry
* Foxboro Co. (Inc.)
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Precision Instrument Co.
* Willcox Engineering Co.
* Worthington Pump & Machinery Corp'n
* Yarnall-Waring Co.

Meters, Oil
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Richardson-Phenix Co.
* Worthington Pump & Machinery Corp'n

Meters, Pitot Tube
* American Blower Co.
* Lockett, A. M. & Co. (Ltd.)

Meters, Steam
* Bailey Meter Co.
* Builders Iron Foundry
* Foxboro Co. (Inc.)
* General Electric Co.

Meters, V-Notch
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Yarnall-Waring Co.

Meters, Venturi
* Builders Iron Foundry
* National Meter Co.

Meters, Water
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* National Meter Co.
* Willcox Engineering Co.
* Worthington Pump & Machinery Corp'n
* Yarnall-Waring Co.

Micrometers
* Greenfield Tap & Die Corp'n
* Starrett, L. S. Co.

Milling Attachments
LeBlond, R. K. Mch. Tool Co.

Milling Machines
* Niles-Bement-Pond Co.

Milling Machines, Automatic
* Bilton Machine Tool Co.
* Pratt & Whitney Co.

Milling Machines, Hand
* Whitney Mfg. Co.

Milling Machines, Keyseat
* Whitney Mfg. Co.

Milling Machines, Plain
* Bilton Machine Tool Co.
LeBlond, R. K. Mch. Tool Co.
* Warner & Swasey Co.

Milling Machines, Universal
LeBlond, R. K. Mch. Tool Co.

Mills, Ball
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mills, Blooming and Slabbing
Mackintosh, Hemphill & Co.

Mills, Cinder
Standard Equipment Co.

Mills, Grinding
* Jeffrey Mfg. Co.
* Smidth, F. L. & Co.

Mills, Metal Reclaiming
Standard Equipment Co.

Mills, Sheet and Plate
Mackintosh, Hemphill & Co.

Mills, Structural, Rail and Bar
Mackintosh, Hemphill & Co.

Mills, Tube
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mining Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Jeffrey Mfg. Co.
* Worthington Pump & Machinery Corp'n

Mixers, Concrete
Chain Belt Co.

Monorail Systems
(See Tramrail Systems, Overhead)

Motion Recorders
* Foxboro Co. (Inc.)

Motor-Generators
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Motors, Electric
* General Electric Co.
* Shepard Electric Crane & Hoist Co.
* Westinghouse Electric & Mfg. Co.

Moulding Machines
Osborn Mfg. Co.

Nipple Threading Machines
* Landis Machine Co. (Inc.)

Nitrogen Gas
Linde Air Products Co.

Nozzles, Aerating
* Spray Engineering Co.

Nozzles, Blast
* Schutte & Koerting Co.

Nozzles, Sand and Air
* Lunkenheimer Co.

Nozzles, Spray
* Badger, E. B. & Sons Co.
Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.
Star Brass Works
* Yarnall-Waring Co.
* Wheeler, C. H. Mfg. Co.

Odometers
Veeder Mfg. Co.

Ohmeters
* General Electric Co.
* Weston Electrical Instrument Co.

Oil and Grease Cups
* Crane Co.
* Lunkenheimer Co.
* Richardson-Phenix Co.

Oil and Grease Guns
* Royersford Foundry & Machine Co.

Oil Burners, Engines, Filters, Pumps, Separators, etc.
(See Burners, Engines, Filters, Pumps, Separatos, etc., Oil)

Oil Burning Equipment
Best, W. N. (Inc.)
Hammel Oil Burning Equipment Co.
* Lockett, A. M. & Co. (Ltd.)
* Rockwell, W. S. Co.
* Schutte & Koerting Co.

Oil Filtering and Circulating Systems
* Richardson-Phenix Co.

Oil Mill Machinery
* Worthington Pump & Machinery Corp'n

Oil Refinery Equipment
Graver Corp'n
* National Supply Cos.
* Vogt, Henry Machine Co.

Oil Storage and Distributing Systems
* Richardson-Phenix Co.

Oil Tanks
* Scaife, Wm. B. & Sons Co.

Oil Well Machinery
* National Supply Cos.
* Worthington Pump & Machinery Corp'n

Oil Well Supplies
* National Supply Cos.

Oilers, Sight Feed
* Lunkenheimer Co.

Oiling Devices
* Lunkenheimer Co.
* Richardson-Phenix Co.

Oiling Systems
* Lunkenheimer Co.
* Richardson-Phenix Co.

Oils, Fuel
* Texas Co.

Oils, Lubricating
* Texas Co.

Ore Handling Machinery
* Brown Hoisting Machinery Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.

Overhead Track Systems
(See Tramrail Systems, Overhead)

Oxy-Acetylene Supplies
Linde Air Products Co.

Oxygen Gas
* International Oxygen Co.
Linde Air Products Co.

Packing, Ammonia
* France Packing Co.
* U. S. Metallic Packing Co.

Packing, Asbestos
* Johns-Manville, H. W. Co.

Packing, Hydraulic
* France Packing Co.
* Greene, Tweed & Co.
* Johns-Manville, H. W. Co.
Schieren, Chas. A. Co.
* U. S. Metallic Packing Co.

Packing, Leather
Schieren, Chas. A. Co.

Packing, Metallic
* France Packing Co.
* Goetze Gasket & Packing Co.
* Johns-Manville, H. W. Co.
* U. S. Metallic Packing Co.

Packing, Rod (Piston and Valve)
* France Packing Co.
* Greene, Tweed & Co.
* Jenkins Bros.
* Johns-Manville, H. W. Co.
* U. S. Metallic Packing Co.

Packing, Rubber
* Jenkins Bros.
* Johns-Manville, H. W. Co.

Packing, Sheet
* Goetze Gasket & Packing Co.
* Jenkins Bros.
* Johns-Manville, H. W. Co.

Paint, Metal
* General Electric Co.
* Johns-Manville, H. W. Co.

Paints, Technical
Arlington Mfg. Co.

Pans, Vacuum
Bartlett-Hayward Co.
* Willcox Engineering Co.

Paper, Drawing
National Tracing Cloth Co.
New York Blue Print Paper Co.

Paper, Sensitized
National Tracing Cloth Co.
New York Blue Print Paper Co.

Paper, Tracing
National Tracing Cloth Co.

Paraffine Wax Plant Equipment
* Vogt, Henry Machine Co.

Pasteurizers
* Vilter Mfg. Co.

Patterns, Metal and Wood
* Budd Grate Co.

Pencils, Drawing
American Lead Pencil Co.

Penstocks
* Hunt, Rodney Machine Co.
Smith, S. Morgan Co.

Perforated Metals
(See Metals, Perforated)

Petroleum Products
* Texas Co.

Pile Drivers
Clyde Iron Works
* Lidgerwood Mfg. Co.

Pinions, Rolling Mill
Mackintosh, Hemphill & Co.

Pinions, Steel
* General Electric Co.
* New Process Gear Corp'n

Pipe, Cast Iron
* Builders Iron Foundry
* Central Foundry Co.
* United States Cast Iron Pipe & Fdry. Co.

Pipe, Riveted
* Walsh & Weidner Boiler Co.

Pipe, Riveted Steel
* Hunt, Rodney Machine Co.
* Springfield Boiler Co.

Pipe, Soil
* Central Foundry Co.

Pipe, Steel
* Crane Co.

Pipe, Welded
* Crane Co.
* Pittsburgh Valve, Foundry & Construction Co.

Pipe, Wood
* Hunt, Rodney Machine Co.

Pipe, Wrought Iron
Byers, A. M. Company
* Crane Co.

Pipe Coils, Covering, Fittings, etc.
(See Coils, Covering, Fittings, etc., Pipe)

Pipe Cutting and Threading Machines
* Crane Co.
* Greenfield Tap & Die Corp'n
* Landis Machine Co. (Inc.)

Pipe Joint Clamps
(See Clamps, Pipe Joint)

Pipe Line Supplies
* National Supply Cos.

Piping, Power
* Crane Co.
* Dougherty, M. J. Co.
* National Pipe Bending Co.
* Pittsburgh Valve, Foundry & Construction Co.

Piston Rings
* Ever-Tight Piston Ring Co.

Planimeters (Ansler)
* Crosby Steam Gage & Valve Co.

Plate Metal Work
(See Steel Plate Construction)

Pneumatic Tools, Tubes, etc.
(See Tools, Tubes, etc., Pneumatic)

Pointers, Bolt
* Landis Machine Co. (Inc.)

Polishing Machinery
* Builders Iron Foundry
Diamond Machine Co.
* Royersford Foundry & Machine Co.

Poppet Valve Engines
(See Engines, Steam, Poppet Valve)

Powdered Fuel Equipment (for Boiler and Metallurgical Furnaces)
Combustion Engineering Corpn
* Fuller-Lehigh Co.
Heyl & Patterson (Inc.)
* Quigley Furnace Specialties Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Power Transmission Machinery
* Allis-Chalmers Mfg. Co.
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
Chain Belt Co.
Eastern Machinery Co.
* Falls Clutch & Machinery Co.
* General Electric Co.
* Hill Clutch Co.
* Hunt, Rodney Machine Co.
* Jeffrey Mfg. Co.
* Jones, W. A. Fdry & Mch. Co.
* Link-Belt Co.
* Medart Patent Pulley Co.
* Morse Chain Co.
* Royersford Foundry & Machine Co.
* Smidth, F. L. & Co.
Smith, S. Morgan Co.
* Wood's, T. B. Sons & Co.

Presses, Baling
* Philadelphia Drying Machinery Co.

Presses, Blanking
* Bliss, E. W. Co.

Presses, Draw
* Bliss, E. W. Co.

Presses, Extruding
* Bliss, E. W. Co.

Presses, Foot
* Bliss, E. W. Co.
* Royersford Foundry & Machin Co.

Presses, Forging
* Bliss, E. W. Co.

Presses, Hydraulic
* Alliance Machine Co.
* Falls Clutch & Machinery Co.
Mackintosh, Hemphill & Co.
* Morgan Engineering Co.
* Philadelphia Drying Machinery Co.

Presses, Power
* Niles-Bement-Pond Co.

Presses, Punching and Trimming
* Bliss, E. W. Co.
* Royersford Foundry & Machine Co.

Presses, Sheet Metal Working
* Bliss, E. W. Co.

Presses, Wax
* Vogt, Henry Machine Co.

Pressure Gages, Regulators, etc.
(See Gages, Regulators etc., Pressure)

Producers, Gas
Bartlett-Hayward Co.
Cooper, C. & G. Co.
* De La Vergne Machine Co.
* Westinghouse Elec. & Mfg. Co.
* Worthington Pump & Mchy. Corp'n

Profiling Machines
* Pratt & Whitney Co.

Propellers
* Morris Machine Works

Pulleys, Iron
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
* Hill Clutch Co.
* Jeffrey Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
* Link-Belt Co.

* Medart Patent Pulley Co.
* Wood's, T. B. Sons Co.

Pulleys, Paper
Rockwood Mfg. Co.

Pulleys, Steel
* Caldwell, H. W. & Son Co.
* Medart Patent Pulley Co.
* Worcester Pressed Steel Co.

Pulleys, Wood
* Caldwell, H. W. & Son Co.
* Medart Patent Pulley Co.

Pulverized Fuel Feeders
(See Feeders, Pulverized Fuel)

Pulverizers
* Brown, A. & F. Co.
* Fuller-Lehigh Co.
* Jeffrey Mfg. Co.
* Smidth, F. L. & Co.

Pump Governors, Valves, etc.
(See Governors, Valves, etc., Pumps)

Pumping Engines
(See Engines, Pumping)

Pumping Outfits
* Lea-Courtenay Co.

Pumping Systems, Air Lift
* Ingersoll-Rand Co.

Pumps, Air
* Goulds Mfg. Co.
* Westinghouse Electric & Mfg. Co.

Pumps, Ammonia
* Lea-Courtenay Co.
* Worthington Pump & Machinery Corp'n

Pumps, Boiler Feed
* Dayton-Dowd Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Lea-Courtenay Co.
Midwest Engine Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Centrifugal
* Allis-Chalmers Mfg. Co.
* Braun, C. F. & Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Dayton-Dowd Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Hunt, Rodney Machine Co.
* Lammert & Mann Co.
* Lea-Courtenay Co.
Midwest Engine Co.
* Morris Machine Works
* Westinghouse Elec. & Mfg Co.
* Wheeler Condenser & Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Deep Well
* Goulds Mfg. Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Dredging
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Dry Vacuum
(See Pumps, Vacuum)

Pumps, Electric
* Dayton-Dowd Co.
* Goulds Mfg. Co.
* Lea-Courtenay Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Elevator
* Dayton-Dowd Co.
* Worthington Pump & Machinery Corp'n

Pumps, Fire
* Dayton-Dowd Co.
* Lea-Courtenay Co.

Pumps, Hand
* Goulds Mfg. Co.

Pumps, Hydraulic Pressure
* Dayton-Dowd Co.
* Goulds Mfg. Co.
* Lea-Courtenay Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Measuring (Gasoline or Oil)
* Richardson-Phenix Co.

Pumps, Oil
* Goulds Mfg. Co.
Hammel Oil Burning Equipment Co.
* Lunkenheimer Co.
* National Supply Cos.
* Richardson-Phenix Co.
* Worthington Pump & Machinery Corp'n

Pumps, Oil, Force-Feed
* Greene, Tweed & Co.
* Lunkenheimer Co.
* Richardson-Phenix Co.

Pumps, Oil (Hand)
* Richardson-Phenix Co.

Pumps, Power
* Goulds Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Rotary
* Goulds Mfg. Co.
* Hunt, Rodney Machine Co.
* Lammert & Mann Co.

Pumps, Steam
* Braun, C. F. & Co.
* Wheeler Condenser & Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sugar House
* Dayton-Dowd Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sump
* Dayton-Dowd Co.
* Goulds Mfg. Co.
* Morris Machine Works
* Smidth, F. L. & Co.

Pumps, Tank
* Goulds Mfg. Co.
* Lea-Courtenay Co.
* Wheeler Condenser & Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Turbine
* Braun, C. F. & Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Lea-Courtenay Co.
* Morris Machine Works
* Westinghouse Elec. & Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Vacuum
* Chicago Pneumatic Tool Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Lammert & Mann Co.
* Wheeler Condenser & Engineering Corp'n
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Punches, Hydraulic
* Alliance Machine Co.
* Morgan Engineering Co.

Punches, Multiple
* Bliss, E. W. Co.
Mackintosh, Hemphill & Co.
* Niles-Bement-Pond Co.

Punches, Power
* Bliss, E. W. Co.
* Royersford Fdry & Mach. Co.

Punches and Dies
* Bliss, E. W. Co.
* Pratt & Whitney Co.
* Royersford Fdry. & Mach. Co.

Punching and Shearing Machines
* Alliance Machine Co.
* Bliss, E. W. Co.
* Morgan Engineering Co.
* Niles-Bement-Pond Co.
* Royersford Fdry. & Mach. Co.

Purifiers, Oil
Elliott Co.
* Richardson-Phenix Co.

Purifying and Softening Systems, Water
International Filter Co.
* Scaife, Wm. B. & Sons Co.
* Yarnall-Waring Co.

Pyrometers, Electric
* Chicago Flexible Shaft Co.
* Crosby Steam Gage & Valve Co.
* Foxboro Co. (Inc.)
* Locomotive Superheater Co.
* Schaeffer & Budenberg Mfg. Co.
* Taylor Instrument Cos.

Pyrometers, Optical
* Taylor Instrument Cos.

Pyrometers, Radiation
* Taylor Instrument Cos.

Racks, Cut
* James, D. O. Mfg. Co.

Racks Storage, Metal
* Manufatcuring Equipment & Engrg. Co.

Radiators, Steam and Water
* Smith, H. B. Co.

Railways, Industrial
* Link-Belt Co.

Rams, Hydraulic
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Reamers
* Greenfield Tap & Die Corp'n

Receivers, Air
* Ingersoll-Rand Co.
* Scaife, Wm. B. & Sons Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corpn.

Recording Instruments
(See Instruments, Recording)

Reducing Motions
* Crosby Steam Gage & Valve Co.

Refractories
* Crescent Refractories Co.
* Jointless Fire Brick Co.
* King Refractories Co. (Inc.)

Refrigerating Machinery
* De La Vergne Machinery Co.
* Johns-Manville, H. W. Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Westinghouse Electric & Mfg. Co.

Refuse Destructors
(See Destructors, Refuse)

Regulators, Electric
* General Electric Co.
* Westinghouse Elec. & Mfg. Co.

Regulators, Feed Water
Elliott Co.

Regulators, Flow (Steam)
* Schutte & Koertig Co.

Regulators, Pressure
* General Electric Co.
* Illinois Engineering Co.
* Taylor Instrument Cos.

Regulators, Pump
(See Governors, Pump)

Regulators, Temperature
* Foxboro Co. (Inc.)
* Powers Regulator Co.
* Sarco Co. (Inc.)
* Taylor Instrument Cos.

Regulators, Time
* Foxboro Co. (Inc.)

Reservoirs, Aerating
* Spray Engineering Co.

Revolution Counters
(See Counters, Revolution)

Rings, Weldless Steel
Hay-Budden Mfg. Co.
* Pollak Steel Co.

Riveters, Hydraulic
* Alliance Machine Co.
Mackintosh, Hemphill & Co
Morgan Engineering Co.

Riveters, Pneumatic
* Ingersoll-Rand Co.

Rivet Heaters, Electric
* General Electric Co.

Riveting Machines
* Bilton Machine Tool Co.

Rivets
* Reed & Prince Mfg. Co.

Rivets, Aluminum
* Aluminum Co. of America

Rods, Aluminum
* Aluminum Co. of America

Rods, Fibre
* Continental Fibre Co.

Roller Bearings
(See Bearings, Roller)

Rolling Mill Machinery
* Alliance Machine Co.
Mackintosh, Hemphill & Co.
* Morgan Engineering Co.

Rolls
* Pollak Steel Co.

Rolls, Crushing
* Worthington Pump & Machinery Corp'n

Rolls, Sand, Chilled and Steel
Mackintosh, Hemphill & Co.

Roofing
* Johns-Manville, H. W. Co.
* Texas Co.

Roofing, Asbestos
* Johns-Manville, H. W. Co.

Rope Drives
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
* Falls Clutch & Machinery Co.
* Hill Clutch Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.
* Medart Patent Pulley Co.
* Wood's T. B. Sons Co.

Rope, Hoisting
Clyde Iron Works
* Roebling's, John A. Sons Co.

Rope, Transmission
* Caldwell, H. W. & Son Co.
* Link-Belt Co.
* Roebling's, John A. Sons Co.

Rope, Wire
Clyde Iron Works
* Roebling's, John A. Sons Co.

Rubber Goods, Mechanical
* Jenkins Bros.

Salt Making Machinery
* Willcox Engineering Co.

Sand Blast Apparatus
* De La Vergne Machine Co.
* Lunkenheimer Co.
* Pangborn Corporation

Sand-Blast Equipment
* Pangborn Corporation

Saw and Cutter Sharpeners
* Greenfield Tap & Die Corp'n
* Simonds Mfg. Co.

Saw Blades, Hack
* Simonds Mfg. Co.
* Starrett, L. S. Co.

Saw Mill Machinery
* Allis-Chalmers Mfg. Co.

Sawing Machines, Metal
* Greenfield Tap & Die Corp'n

Saws, Circular (Metal)
* Niles-Bement-Pond Co.
* Simonds Mfg. Co.

Scales, Fluid Pressure
* Crosby Steam Gage & Valve Co

Screens, Perforated Metal
* Hendrick Mfg. Co.

Screens, Revolving
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.
* Smidth, F. L. & Co.

Screens, Shaking
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.

Screens, Traveling
Chain Belt Co.
* Link-Belt Co.

Screw Cutting Dies
(See Dies, Thread Cutting)

Screw Machine Products
Lippincott-Carwen Corp'n

Screw Machines, Hand
* Jones & Lamson Mach. Co.
* Warner & Swasey Co.

Screw Plates
* Greenfield Tap & Die Corp'n

Screw Steel
* Union Drawn Steel Co.

Screws, Cap & Set
Allen Mfg. Co.
* Reed & Prince Mfg. Co.

Screws, Machine
* Reed & Prince Mfg. Co.

Screws, Safety Set
Allen Mfg. Co.

Screws, Wood
* Reed & Prince Mfg. Co.

Separators, Ammonia
* De La Vergne Machine Co.
Elliott Co.

Separators, Oil
* Crane Co.
* De La Vergne Machine Co.
Elliott Co.
* H. S. B. W.-Cochrane Corp'n
* Illinois Engineering Co.
* National Pipe Bending Co.

Separators, Steam
* Crane Co.
Elliott Co.
* H. S. B. W.-Cochrane Corp'n
* Illinois Engineering Co.
* National Pipe Bending Co.
* Pittsburgh Valve Fdry. & Const. Co.

Shaft Couplings, Flexible
Dexter, I. H. Co. (Inc.)

Shafting
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
Chain Belt Co.
Cumberland Steel Co.
* Falls Clutch & Mchy. Co.
* Hill Clutch Co.
* Pollak Steel Co.
* Union Drawn Steel Co.
* Wood's, T. B. Sons Co.

Shafting, Cold Drawn
* Medart Patent Pulley Co

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1920 Volume*

Shafting, Flexible
* Chicago Flexible Shaft Co.
* Gwilliam Co.

Shapers
* Niles-Bement-Pond Co.
* Pratt & Whitney Co.

Shapes, Cold Drawn Steel
* Union Drawn Steel Co.

Shapes, Rolled Steel
* Pollak Steel Co.

Shears, Alligator
* Morgan Engineering Co.
* Royersford Foundry & Machine Co.

Shears, Hydraulic
* Alliance Machine Co.
Mackintosh, Hemphill & Co.
* Morgan Engineering Co.

Shears, Plate
* Alliance Machine Co.
Mackintosh, Hemphill & Co.
* Morgan Engineering Co.
* Niles-Bement-Pond Co.

Shears, Squaring
* Bliss, E. W. Co.
* Niles-Bement-Pond Co.

Sheaves, Rope
* Brown, A. & F. Co.
* Caldwell, H. W. & Son Co.
Clyde Iron Works
* Falls Clutch & Machinery Co.
* Hill Clutch Co.
* Jeffrey Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
* Link-Belt Co.
Mackintosh, Hemphill & Co.
* Medart Patent Pulley Co.
* Wood's, T. B. Sons Co.

Sheet Metal Work
* Allington & Curtis Mfg. Co.
* Willcox Engineering Co.

Sheet Metal Working Machinery
* Bliss, E. W. Co.
* Niles-Bement-Pond Co.

Sheets, Aluminum
* Aluminum Co. of America

Sheets, Fibre
* Continental Fibre Co.

Shelving, Metal
* Manufacturing Equipment & Engrg. Co.

Shipbuilding Machinery
* Morgan Engineering Co.

Shredders
* Jeffrey Mfg. Co.

Siphons (Steam-Jet)
* Schutte & Koerting Co.

Sirens
(See Whistles, Steam)

Slitting Machines
* Bilton Machine Tool Co.
* Bliss, E. W. Co.
* Niles-Bement-Pond Co.

Slotters, Machine
* Niles-Bement-Pond Co.

Sluice Gates
(See Gates, Sluice)

Smoke Recorders
* Sarco Co. (Inc.)

Smoke Stacks and Flues
(See Stacks, Steel)

Sockets, Wire Rope
(See Wire Rope Fastenings)

Soot Blowing Systems
* Bayer Steam Soot Blower Co.
Diamond Power Specialty Co.

Special Machinery
* Brown, A. & F. Co.
* Builders Iron Foundry
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Fawcus Machine Co.
* Lammert & Mann Co.
Mackintosh, Hemphill & Co.
* Morgan Engineering Co.
* Smidth, F. L. & Co.
* Vilter Mfg. Co.

Speed Reducing Transmissions
* De Laval Steam Turbine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.

Spouts, Grain
* Caldwell, H. W. & Son Co.

Spray Cooling Ponds
* Badger, E. B. & Sons Co.
Cooling Tower Co. (Inc.)
* Spray Engineering Co.
Star Brass Works

Spray Cooling Systems
Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Star Brass Works

Spray Nozzles
(See Nozzles, Spray)

Sprays, Water
* Badger, E. B. & Sons Co.
Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Yarnall-Waring Co.

Springs, Coiled
New York Wire & Spring Co.

Springs, Steel
New York Wire & Spring Co.

Springs, Vanadium
New York Wire & Spring Co.

Springs, Wire
New York Wire & Spring Co.

Sprinklers, Spray
Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprinklers Systems, Fire
Schofield's J. S. Sons Co.

Sprockets
* Baldwin Chain Mfg. Co.
* Caldwell, H. W. & Son Co.
Chain Belt Co.
* Fuller-Lehigh Co.
* Gifford-Wood Co.
* Hill Clutch Co.
* Jeffrey Mfg. Co.
* Link-Belt Co.
* Medart Patent Pulley Co.

Stacks, Steel
* Bigelow Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Graver Corp'n
* Heine Safety Boiler Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Stampings, Brass
* Worcester Pressed Steel Co.

Stampings, Sheet Metal
* Worcester Pressed Steel Co.

Stampings, Steel
* Worcester Pressed Steel Co.

Standpipes
* Cole, R. D. Mfg. Co.
Golden-Anderson Valve Specialty Co.
Schofield's, J. S. Sons Co.
* Walsh & Weidner Boiler Co.

Steam Engines, Separators, Superheaters, Traps, Turbines, etc.
(See Engines, Separators, Superheaters, Traps, Turbines, etc., Steam)

Steam Specialties
* Crane Co.
Golden-Anderson Valve Specialty Co.
* Illinois Engineering Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Sarco Co. (Inc.)
* Yarnall-Waring Co.

Steel, Alloy
Climax Molybdenum Co.
Electric Steel & Forge Co.
* Union Drawn Steel Co.

Steel, Bright Finished
* Union Drawn Steel Co.

Steel, Cold Drawn
* Union Drawn Steel Co.
Ward's, Edgar T. Sons Co.

Steel, Cold Rolled
Cumberland Steel Co.
* Union Drawn Steel Co.
Ward's, Edgar T. Sons Co.

Steel, Crucible
Electric Steel & Forge Co.
* Pollak Steel Co.
* Simonds Mfg. Co.

Steel, Electric
* Simonds Mfg. Co.

Steel, High Speed
Haynes Stellite Co.
Ward's, Edgar T. Sons Co.

Steel, Magnet
Ward's, Edgar T. Sons Co.

Steel, Molybdenum
Climax Molybdenum Co.

Steel, Nickel
* Union Drawn Steel Co.

Steel, Open hearth
Electric Steel & Forge Co.
*Union Drawn Steel Co.

Steel Plate Construction
Bartlett-Hayward Co.
* Bigelow Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Graver Corp'n
* Heine Safety Boiler Co.
* Hunt, Rodney Machine Co.
* Keeler, E. Co.
Schofield's, J. S. Sons Co.
Sun Shipbuilding Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Steel Strip (Hot and Cold Rolled)
* Worcester Pressed Steel Co.

Steel, Tool
Haynes Stellite Co.
Ward's, Edgar T. Sons Co.

Steel, Vanadium
*Union Drawn Steel Co.

Steering Engines
(See Engines, Steering)

Stocks and Dies
* Greenfield Tap and Die Corp'n
* Landis Machine Co. (Inc.)
* Pratt & Whitney Co.

Stokers, Chain Grate
* Babcock & Wilcox Co.
Combustion Engineering Corp'n
Green Engineering Co.
* Illinois Stoker Co.
* Westinghouse Elec. & Mfg. Co.

Stokers, Hand Operated
* Files Engineering Co.

Stokers, Overfeed
* Murphy Iron Works
* Westinghouse Elec. & Mfg. Co.

Stokers, Underfeed
* American Engineering Co.
Combustion Engineering Corp'n
* Riley, Sanford Stoker Co. (Ltd.)
* Underfeed Stoker Co. of America
* Westinghouse Elec. & Mfg. Co.

Stools and Chairs, Metal
* Manufacturing Equipment & Engrg. Co.

Strainers, Oil
Hammel Oil Burning Equipment Co.
* Lockett, A. M. & Co. (Ltd.)
* Richardson-Phenix Co.

Strainers, Water
* Braun, C. F. & Co.
Elliott Co.
Golden-Anderson Valve Specialty Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.

Strainers, Water, Traveling
Chain Belt Co.
* Link-Belt Co.

Structural Steel Work
* Hendrick Mfg. Co.
Schofield's, J. S. Sons Co.
* Walsh & Weidner Boiler Co.

Sugar Machinery
Bartlett-Hayward Co.
* Hooven, Owens, Rentschler Co.
* Walsh & Weidner Boiler Co.

Superheaters, Steam
* Babcock & Wilcox Co.
Brinckerhoff, H. Gordon Co.
* Heine Safety Boiler Co.
* Locomotive Superheater Co.
Power Specialty Co.

Superheaters, Steam (Locomotive)
* Locomotive Superheater Co.
Power Specialty Co.

Superheaters, Steam (Marine)
* Locomotive Superheater Co.
Power Specialty Co.

Switchboards
Condit Electrical Mfg. Co.
* General Electric Co.
* Westinghouse Elec. & Mfg. Co.

Switches, Electric
Condit Electrical Mfg. Co.
* General Electric Co.
* Westinghouse Elec. & Mfg. Co.

Synchronous Converters
(See Converters, Synchronous)

Synchroscopes
* Weston Electrical Instrument Co.

Tables Drawing
New York Blue Print Paper Co.

Tachometers
* Foxboro Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co.
Veeder Mfg. Co.
* Weston Electrical Instrument Co.

Tackle Blocks
(See Blocks, Tackle)

Tank Work (Air, Gas, Oil, Water)
* Bigelow Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Heine Safety Boiler Co.
* Scaife, Wm. B. & Sons Co.
* Union Iron Works

Tanks, Aluminum
* Aluminum Co. of America

Tanks, Copper
* Badger, E. B. & Sons Co.

Tanks, Steel
Graver Corp'n
* Heine Safety Boiler Co.
Schofield's, J. S. Sons Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.
* Vogt, Henry Machine Co.

Tanks, Storage
* Cole, R. D. Mfg. Co.
Graver Corp'n
Green Engineering Co.
* H. S. B. W.-Cochrane Corp'n
* Scaife, Wm. B. & Sons Co.
* Walsh and Weidner Boiler Co.

Tanks, Tower
* Walsh & Weidner Boiler Co.

Tanks, Welded
* Cole, R. D. Mfg. Co.
* Scaife, Wm. B. & Sons Co.

Tap Extensions
Allen Mfg. Co.

Tapping Attachments
* Whitney Mfg. Co.

Tapping Machines
* Pratt & Whitney Co.

Taps and Dies
* Greenfield Tap & Die Corpn.
* Pratt & Whitney Co.

Telescopic Oilers
(See Oilers, Telescopic)

Temperature Regulators
(See Regulators, Temperature)

Testing Laboratories, Cement
* Smidth, F. L. & Co.

Textile Wet Finishing Machinery
* Hunt, Rodney Machine Co.

Thermometers
* Ashton Valve Co.
* Chicago Flexible Shaft Co.
* Foxboro Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co.
* Taylor Instrument Cos.

Thermometers, Distance
* Foxboro Co. (Inc.)
* Taylor Instrument Cos.

Thermometers, High Range
* Chicago Flexible Shaft Co.
* Taylor Instrument Cos.

Thermostats
* General Electric Co.
* Powers Regulator Co.

Thread Cutting Tools
* Crane Co.
* Greenfield Tap & Die Corp'n
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Threading Machines, Pipe
* Landis Machine Co. (Inc.)

Time Controllers
(See Regulators, Time)

Time Recorders
* Foxboro Co. (Inc.)

Tipples, Steel
* Jeffrey Mfg. Co.
* Link-Belt Co.

Tools, Brass-Working Machine
* Warner & Swasey Co.

Tools, Electric
* Chicago Pneumatic Tool Co

Tools, Lathe
Haynes Stellite Co.

Tools, Machinist's Small
Johansson, C. E. (Inc.)
Pratt & Whitney Co.
* Starrett, L. S. Co.

Tools, Planer
Haynes Stellite Co.

Tools, Pneumatic
* Chicago Pneumatic Tool Co.
* Ingersoll-Rand Co.

Torches, Hand
* Best, W. N. (Inc.)

Track, Industrial
* Northern Engineering Works

Tractors
* Allis-Chalmers Mfg. Co.
* Dayton-Dowd Co.

Tramrail Systems, Overhead
* Brown Hoisting Machinery Co.
* Ford Chain Block Co.
* Link-Belt Co.
* Northern Engineering Wks.
* Shepard Electric Crane & Hoise Co.
* Whiting Corp'n

Tramways, Bridge
* Brown Hoisting Machinery Co.
* Link-Belt Co.

Tramways, Wire Rope
Clyde Iron Works
* Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

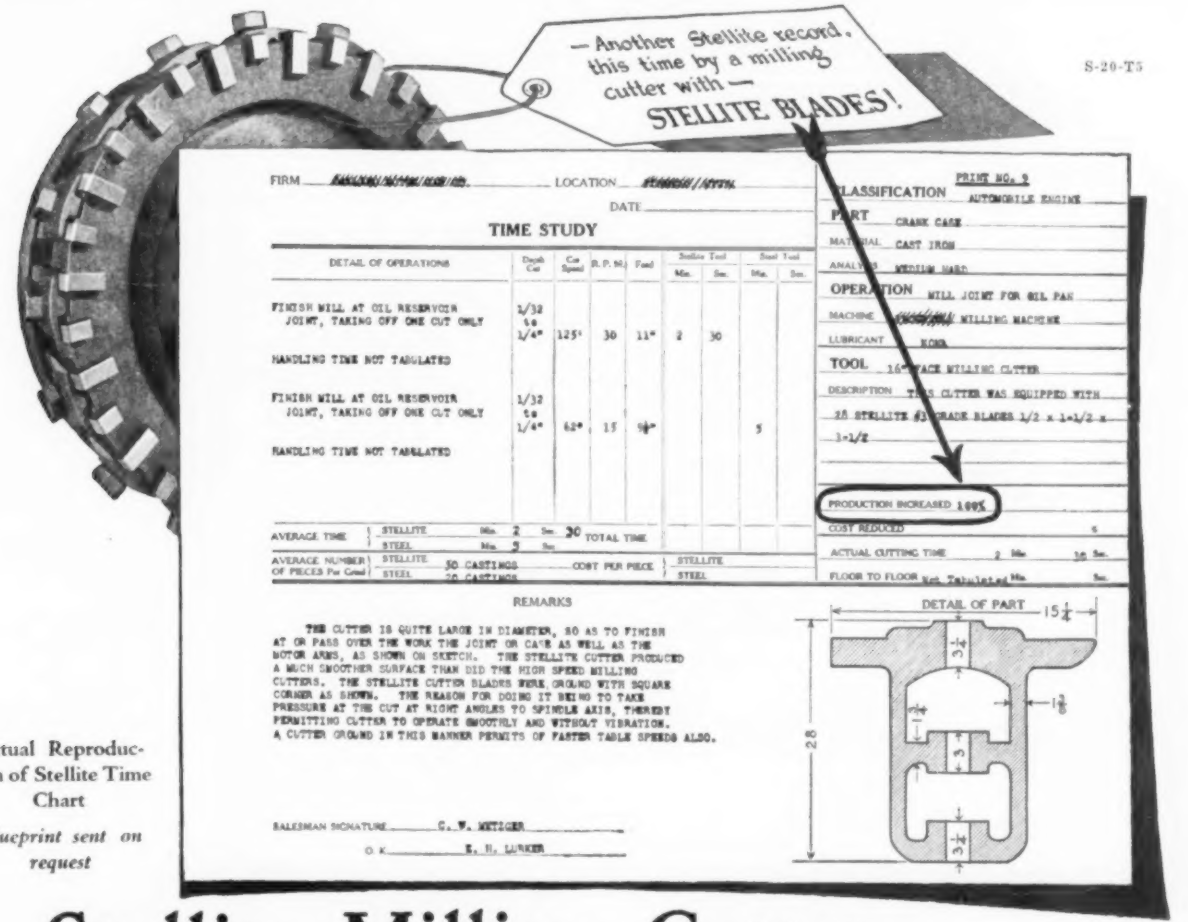
Transformers, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Transmission Machinery
(See Power Transmission Machinery)

Transmissions, Automobile
* Foote Bros. Gear & Machine Co.
Grant-Lees Gear Co.

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1920 Volume*

S-20-T5



Actual Reproduction of Stellite Time Chart

Blueprint sent on request

Stellite Milling Cutter

(RUNNING AT DOUBLE SPEED!)

doubles production

STELLITES' remarkable qualities—extreme hardness; inherent, unchangeable temper; increased toughness at high heat—permitted doubling the speed of the cutter in this case and resulted in 100% increased production.

Following is an extract from the Stellite Service Engineers' report of this test, which was milling the face of crank case for a large motor car company in the middle West—

"When Stellite was started the periphery speed was doubled—increased to 125 feet per minute and table travel to 11" per minute—just twice the speed at which they had been running the High Speed Cutter. We ran 50 cases per grind with a far better finished surface than with the High Speed Steel cutters running from 1 to 15 cases per grind.

Our increase in production in this case was about 100%, since the handling time was not changed and our increased life of cutters between grinding allowed us an extra margin, due to time saved in changing cutters."

Stellites' Field Service Engineers are available, without obligation on your part, to demonstrate Stellite in your plant. With accurate data on practically any operation in which you are interested, they will help determine how Stellite will increase production and effect savings for you. A demonstration may be arranged by writing to the nearest office.

HAYNES STELLITE COMPANY

Kokomo, Indiana — Carbide and Carbon Bldg., 30 E. 42d St., New York — Peoples Gas Bldg., Chicago, Ill.

CLASSIFIED LIST OF MECHANICAL EQUIPMENT (Continued)

FOR ALPHABETICAL INDEX, SEE PAGE 142

Traps, Return
* American Blower Co.
* Crane Co.
* Illinois Engineering Co.

Traps, Steam
* American Blower Co.
* Crane Co.
Elliott Co.
Golden-Anderson Valve Specialty Co.
* Illinois Engineering Co.
* Jenkins Bros.
* Johns-Manville, H. W. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Pratt & Cady Co. (Inc.)
* Sarco Co. (Inc.)
* Schutte & Koerting Co.

Traps, Vacuum
* American Blower Co.
* Crane Co.
* Illinois Engineering Co.
* Sarco Co. (Inc.)

Trolleys
Curtis Pneumatic Machinery Co.

Trucks, Electric
Brinckerhoff, H. Gordon Co.

Tube Cleaners, Boiler
* Johns-Manville, H. W. Co.
* Yarnall-Waring Co.

Tubing, Aluminum
* Aluminum Co. of America

Tubing, Fibre
* Continental Fibre Co.

Tumbling Barrels
* Northern Engineering Works
* Pangborn Corporation
* Royersford Fdry. & Mch. Co.
* Whiting Corp'n

Turbine-Blowers
* Ingersoll-Rand Co.

Turbine-Compressors
* Ingersoll-Rand Co.

Turbines, Hydraulic
* Allis-Chalmers Mfg. Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Jolly, J. & W. (Inc.)
* Leffel, James & Co.
Smith, S. Morgan Co.
* Worthington Pump & Mchy. Corp'n

Turbines, Steam
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Co.
* Moore Steam Turbine Corp'n
* Terry Steam Turbine Co.
* Westinghouse Elec. & Mfg. Co.

Turbo-Blowers
* General Electric Co.
* Moore Steam Turbine Corp'n

Turbo-Generators
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
* Moore Steam Turbine Corp'n
* Terry Steam Turbine Co.
* Westinghouse Elec. & Mfg. Co

Turbo-Pumps
* Moore Steam Turbine Corp'n
* Terry Steam Turbine Co.
* Wheeler Condenser & Engineering Co.

Turntables
* Link-Belt Co.
* Northern Engineering Works

Turret Machines
* Jones & Lamson Machine Co.
LeBlond, R. K. Mch. Tool Co
* Warner & Swasey Co.

Underfeed Stokers
(See Stokers, Underfeed)

Uniflow Engines
(See Engines, Steam, Uniflow

Unions
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Unloaders, Air Compressor
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n
* Yarnall-Waring Co.

Unloaders, Ballast
* Lidgerwood Mfg. Co.

Unloaders, Car
* Link-Belt Co.
* Robbins Engineering Co.

Vacuum Dryers, Pans, Pumps, Traps, etc.
(See Pans, Pumps, Traps, etc., Vacuum)

Valve Discs
* Goetze Gasket & Packing Co.
* Jenkins Bros.

Valves, Air, Automatic
* Jenkins Bros.
* Smith, H. B. Co.

Valves, Air Relief
* Lunkenheimer Co.
* Schutte & Koerting Co.

Valves, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Homestead Valve Mfg. Co. (Inc.)
* Jenkins Bros.
* Lunkenheimer Co.
* Pratt & Cady Co. (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Valves, Back Pressure
* Crane Co.
* H. S. B. W.-Cochrane Corp'n
* Illinois Engineering Co.
* Jenkins Bros.
* Nelson Valve Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Pratt & Cady Co. (Inc.)
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.

Valves, Balanced
* Crane Co.
Golden-Anderson Valve Specialty Co.
* Homestead Valve Mfg. Co. (Inc.)
* Lunkenheimer Co.
* Schutte & Koerting Co.

Valves, Blowoff
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
Elliott Co.
* Homestead Valve Mfg. Co. (Inc.)
* Jenkins Bros.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Pratt & Cady Co. (Inc.)
* Richardson-Phenix Co.
* Yarnall-Waring Co.

Valves, Butterfly
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.

Valves, Check
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Nelson Valve Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Pratt & Cady Co. (Inc.)
* Richardson-Phenix Co.
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Valves, Exhaust Relief
* Crane Co.
* H. S. B. W.-Cochrane Corp'n
* Illinois Engineering Co.
* Jenkins Bros.
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.
* Wheeler Condenser & Engineering Co.
* Wheeler, C. H. Mfg. Co.

Valves, Float
* Crane Co.
Golden-Anderson Valve Specialty Co.
* Homestead Valve Mfg. Co. (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.

Valves, Foot
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Worthington Pump & Mchy. Corp'n

Valves, Gate
Bartlett-Hayward Co.
* Braun, C. F. & Co.
* Crane Co.
* Dougherty, M. J. Co.
* Hunt, Rodney Machine Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Nelson Valve Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Pratt & Cady Co. (Inc.)
* Schutte & Koerting Co.

Valves, Globe, Angle and Cross
* Crane Co.
* Crosby Steam Gage & Valve Co.
Golden-Anderson Valve Specialty Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Nelson Valve Co.
* Pittsburgh Valve, Fdry & Const. Co.
* Pratt & Cady Co. (Inc.
* Richardson-Phenix Co.
* Vogt, Henry Machine Co.

Valves, Hose
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Nelson Valve Co.
* Pratt & Cady Co. (Inc.)

Valves, Hydraulic
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Homestead Valve Mfg. Co. (Inc.)
* Lunkenheimer Co.
* Morgan Engineering Co.
* Nelson Valve Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Pratt & Cady Co. (Inc.)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.
* Yarnall-Waring Co.

Valves, Hydraulic Operating
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Pratt & Cady Co. (Inc.)
* Schutte & Koerting Co.
* Yarnall-Waring Co.

Valves, Non-Return
* Crane Co.
* Crosby Steam Gage & Valve Co.
Golden-Anderson Valve Specialty Co.
* Illinois Engineering Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Nelson Valve Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Pratt & Cady Co. (Inc.)
* Schutte & Koerting Co.

Valves, Plug
* Homestead Valve Mfg. Co. (Inc.)
* Pratt & Cady Co. (Inc.)

Valves, Pop Safety
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Valves, Pump
* Goulds Mfg. Co.
* Jenkins Bros.
* Johns-Manville, H. W. Co.
* Richardson-Phenix Co.

Valves, Radiator
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Pratt & Cady Co. (Inc.)

Valves, Reducing
Elliott Co.
Golden-Anderson Valve Specialty Co.

Valves, Regulating
* Crane Co.
Golden-Anderson Valve Specialty Co.
* Illinois Engineering Co.
* Lunkenheimer Co.

Valves, Relief (Water)
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
Golden-Anderson Valve Specialty Co.
* Lunkenheimer Co.

Valves, Safety
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Pratt & Cady Co. (Inc.)

Valves, Stop & Check
(See Valve, Non-Return)

Valves, Superheated Steam (Steel)
* Crane Co.
* Jenkins Bros.
* Illinois Engineering Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Pittsburgh Valve, Fdry. & Const Co.
* Pratt & Cady Co. (Inc.)
* Richardson-Phenix Co.
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Throttle
* Crane Co.
* Jenkins Bros
* Lunkenheimer Co.
* Nelson Valve Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.

Vellum
National Tracing Cloth Co.

Ventilating Systems
* American Blower Co.

Voltmeters
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
* Weston Electrical Instrument Co.

Vulcanizers
* Bigelow Co.

Wash Bowls
* Manufacturing Equipment & Engrg. Co.

Washers
* Worcester Pressed Steel Co.

Washers, Leather
Schieren, Chas. A. Co.

Water Cinder Mills
(See Mills, Cinder, Water)

Water Circulators, Filters, Gages, Heaters, Meters, Strainers, etc.
(See Circulators, Filters, Gages, Heaters, Meters, Strainers, etc., Water)

Water Columns
* Ashton Valve Co.
* Lunkenheimer Co.

Water Controlling Apparatus
* Hunt, Rodney Machine Co.

Water Purifying Plants
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Water Softeners
Graver Corp'n
* H. S. B. W.-Cochrane Corpn
International Filter Co.
* Scaife, Wm. B. & Sons Co.
* Yarnall-Waring Co.

Water Tube Boilers
(See Boilers, Water Tube)

Water Wheels, Turbine
* Cramp, Wm. & Sons Ship & Engine Bldg Co.
* Hunt, Rodney Machine Co.
* Jolly, J. & W. (Inc.)
* Leffel, James & Co.
Smith, S. Morgan Co.
* Worthington Pump & Mchy. Corp'n

Waterbacks, Furnace
Green Engineering Co.

Wrenches
* Greene, Tweed & Co.
* Roebling's, John A. Sons Co
* Worcester Pressed Steel Co.

Wrenches Tap
* Greenfield Tap & Die Corp'n

Waterproofing Materials
* Johns-Manville, H. W. Co
* Texas Co.

Wattmeters
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
* Weston Electrical Instrument Co

Weighers, Water
* Willcox Engineering Co.

Welding and Cutting Work
Linde Air Products Co.

Welding, Oxy-Acetylene
* Pittsburgh Valve, Fdry. & Const. Co.

Welding Equipment, Electric
* General Electric Co

Welding Metals
(See Metals, Welding)

Well Drilling Machinery
* National Supply Cos.

Wheels, Car
* Fuller-Lehigh Co.

Wheels, Emery
Diamond Machine Co.

Wheels, Polishing Paper
Rockwood Mfg. Co

Whistles, Steam
* Ashton Valve Co.
* Brown, A. & F. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Winches
* Brown Hoisting Machinery Co.
* Lidgerwood Mfg. Co.

Wire, Aluminum
* Aluminum Co. of America

Wire, Brass and Copper
* Roebling's, John A. Sons Co.

Wire, Flat
* Roebling's John A. Sons Co.

Wire, Iron and Steel
* Roebling's, John A. Sons Co.

Wire and Cables, Electrical
* Aluminum Co. of America
* General Electric Co.
* Roebling's, John A. Sons Co.

Wire Cloth
*Caldwell, H. W. & Son Co.

Wire Mechanism (Bowden Wire)
* Gwilliam Co.

Wire Rope
(See Rope, Wire)

Wire Rope Fastenings
* Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Wire Rope Slings
* Roebling's, John A. Sons Co.

Wiring Devices
* General Electric Co.

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1920 Volume*

Alphabetical List of Advertisers

See Pages 124-140 for Classified List of Mechanical Equipment

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